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WORLD WAR II GERMAN  
FIRE DOCUMENT TRANSLATIONS

CONTRACT NO. NOO22866C0317  
OCD WORK UNIT NO. 2536D

STANFORD RESEARCH INSTITUTE

ARMENIO PARK CALIFORNIA





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## **WORLD WAR II GERMAN FIRE DOCUMENT TRANSLATIONS**

By: Carl F. Miller

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## INTRODUCTION

In a previously reported study,<sup>\*</sup> information on World War II fires and fire-fighting experiences in Germany was collected. Approximately 10,000 pages of fire department records in the city of Hamburg were copied, and various other documents, photographs, and movie films were obtained. In addition to information on the behavior of fires and on fire fighting, the documentation includes information on the response of structures and people to both fire and blast effects.

Since the copied records are all in German, many in handwritten script, their translation into English was needed to make them more generally useful as input information to the Office of Civil Defense and other research programs on fire behavior and on civil defense protective measures in general.

The major objective of this reported work was to translate selected portions of the copied records into English and to analyze the translated materials with respect to their suitability for future publication in the form of documentation reports.

This report summarizes the documents that were translated and the general kinds of information contained in each type of report. The translated version of an evaluated report on the fires resulting from the German attack on Rotterdam, Holland, on May 14, 1940, written by Hans Rumpf, colonel of the German fire protection police, is appended to illustrate several points of practical interest with respect to fire protection, fire behavior, and behavior of the people. This report is not at all typical of the Hamburg fire department records; the latter give much more detailed information on the actions and location of the fire-fighting groups and on the progress of the fire.

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\* See Carl F. Miller (Stanford Research Institute) and James W. Kerr (Office of Civil Defense), Field Notes on World War II German Fire Experience, Stanford Research Institute, Project No. MU-5070, October 1965.

## SUMMARY OF RESULTS

The German World War II fire records that were translated are listed in Table 1 along with the number of pages of English text.

The report of the Hamburg police president is a compilation and summary of information on the events that took place as a consequence of the air attacks on Hamburg during the period of July 25, 1943, to August 3, 1943. The general report summarizes, in tabular form, the mode of the attacks and the number of bombs that were dropped, the casualty estimates, the amount of damage that occurred to structures, and the estimates of loss of productive capacity.

The appendices to the police president's report (actually as appendices to part two of the president's report, which has been previously translated and distributed by the United Kingdom) contain back-up material for the other sections of the report. The organizational structure of the defense forces, general instructions for these forces, and their mode of operation, along with background material of the experience of these forces in previous attacks on the city, are described in the first seven appendices. Appendices 8 through 19 give details on the July 25 to August 3 attacks and on the events that took place in the city during and after the attacks. The eyewitness reports are of interest because they convey a realism to the fire and its consequences that cannot be obtained from the tabulated data and other generalized accounts. The postattack problems of a damaged city are evident in the descriptions of how the authorities proceeded to reconstitute control and how they attempted to cope with the problems of debris removal, movement of people, feeding, health and welfare, looting, and restoration of utilities and services. Appendix 19 describes, in some detail, the effectiveness of various kinds of shelters in protecting the occupants against fire and blast. To a degree, some of the material in the police president's report was apparently selected to show that the local authorities did all that could be done to counter the effects of the attack and to alleviate the consequences of possible charges of negligence from either higher authorities or the populace.

Most of the detailed data and the information on which some of the material given in the police president's report is largely based are given

Table 1

## SUMMARY OF TRANSLATED WORLD WAR II GERMAN FIRE DEPARTMENT DOCUMENTS

Name of Report or Document		Number of Translated Pages <sup>a</sup>
1. Report of the Hamburg Police President		
General Report About the Four Massive Air Attacks and Three Smaller Air Attacks on Hamburg from July 25 to August 3, 1943 . . . . .		71
Appendix 1	Map of Hamburg; Direct Hit Picture to 7/24/43 . . . . .	-
Appendix 2	Numerical Summary to 7/24/43 . . . . .	3
Appendix 3	Pictorial History of Events to 7/24/43 (charts and graphs) . . . . .	-
Appendix 4	Sectional Division of the Security Police (maps) . . . . .	-
Appendix 5	Organization and Structure of the Security Police (chart) . . . . .	-
Appendix 6	Organization and Structure of the Air Defense Police (table) . . . . .	1
Appendix 7	Police Bulletins, Service Orders, and Organization Plans for Emergency Service Situations . . . . .	245
Appendix 8	Air Attacks on Hamburg from 7/25/43 to 8/3/43; Map of Flight Paths of Attacking Planes . . . . .	-
Appendix 9	Air Attacks on Hamburg from 7/25/43 to 8/3/43; Picture Report . . . . .	-
Appendix 10	Air Attacks on Hamburg from 7/25/43 to 8/3/43; Eyewitness Reports . . . . .	90
Appendix 11	Aircraft Spotter Stations (map) . . . . .	-
Appendix 12	Reconstitution of the Air Defense Service; Proclamation to the Public; Two News Articles from the Hamburger Tageblatt; Service Orders; Bulletin to the Expanded Self-Defense Units and Press Clippings; and Instructions of the Air Defense Command . . . . .	70

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<sup>a</sup> English text, unedited draft.

Table 1 (continued)

Name of Report or Document		Number of Translated Pages <sup>a</sup>
Appendix 13	Police Security Measures; Posters; Cases of Looting;	
	Newspaper Clippings . . . . .	11
Appendix 14	Relocation of Population; Plan Indicating Assembly Points	
	and Closed-Off Streets . . . . .	4
Appendix 15	Expert Opinions on the Danger of Epidemics Caused by Corpses;	
	Report on Causes of Death . . . . .	26
Appendix 16	Accounting of Missing Persons; Police Bulletins; Newspaper	
	Clippings . . . . .	13
Appendix 17	Health Measures; Newspaper Clippings . . . . .	12
Appendix 18	Report on Efforts to Restore Public Utilities and Services . . . . .	14
Appendix 19	Experiences with Air Defense Shelters; Charts and	
	Picture Material . . . . .	37
Total		597
2. Hamburg Fire Department Documentation Reports		
Volume 1	Air Attacks 1 to 6; 5/18/40 to 6/12/40 . . . . .	67
Volume 13	Air Attacks 154-156; Territory West; 7/25/43 to 8/3/43 . . . . .	426
Volume 13	Air Attacks 154-156; Territory East; 7/25/43 to 8/3/43 . . . . .	326
Volume 13	Air Attacks 154-156; Territory South; 7/25/43 to 8/3/43 . . . . .	269
Volume 14	Air Attacks 157-159; 6/1/44 to 6/30/44 . . . . .	197
Volume 15	Air Attacks 160-161; 7/1/44 to 7/31/44 . . . . .	137
Miscellaneous Reports:		
	No. 1: 7/25/43 to 7/28/43 . . . . .	40
	No. 2: 7/29/43 to 8/3/43 . . . . .	47

<sup>a</sup> English text, unedited draft.

Table 1 (concluded)

Name of Report or Document	Number of Translated Pages <sup>a</sup>
No. 3: 7/25/43 to 8/3/43 . . . . .	88
No. 4: 7/25/43 to 8/3/43 . . . . .	75
No. 5: 7/25/43 to 8/3/43 . . . . .	78
No. 7: 12/28/43 . . . . .	88
Total	1,838
3. Out-of-Town Fire Department Documentation Reports . . . . .	331
4. Reports on Industrial Damage . . . . .	161
5. Report of the Regimental Commander of the Fire Protection Police Regiment Saxony on the Course and Results of the Massive Aerial Attacks on Rotterdam on May 14, 1940, and the Experiences Drawn Therefrom . . . . .	71
6. Examination of Building Density and Fuel Loading in the Districts Eimsbüttel and Hammerbrook of the City of Hamburg in the Year 1943 by R. Schubert . . . . .	53

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<sup>a</sup> English text, unedited draft.

in the Hamburg fire department documentation reports and the out-of-town fire department documentation reports. The assignments of all the fire fighting units, the locations and times of operation, type of operation, relative success and failure in extinguishing the fires or in preventing their spread, and the structures destroyed or damaged are tabulated in these fire department action reports. In addition, eyewitness accounts of many individuals in the units are included in these reports. The miscellaneous reports include log accounts of reports at headquarters and copies of messages that were sent between units and headquarter groups. Difficulties with equipment, with water supply, with people, with methods, and with many details of coping with a large-scale fire are enumerated throughout the whole set of reports. The central theme of these reports is on the fire-fighting operations and the problems related thereto. Thus, the material would probably be of more use in planning fire-fighting operations and the efficiency of fire-fighting units and equipment than in studies of fire behavior, although data relating to fire spread are contained in the reports.

The industrial damage reports are, to a large degree, reports intended to indicate loss of productive capacity by industries important to the war effort. Some account is given of the defense units and defense plans and operations of the industrial concerns; the general indication is that their contributions to and effectiveness in coping with the fire problems were rather low compared with those of the professional organizations.

The fuel-loading study by Schubert is largely in tabular form; only the introductory portions were translated.

Because of the potential application to future studies and to the clarification of details about the Hamburg World War II fires, it is recommended that the translations of the Hamburg police president's report and Hamburg fire department documentation reports of the air attacks of July 25 to August 3, 1943, be edited, published, and distributed to investigators in the Office of Civil Defense research program and other agencies. In addition, it is recommended that selected other portions of the fire department records (such as those from the second largest air attack on July 27 and 28, 1944) and Schubert's report be published for a more limited scale of distribution. These publications should include pertinent available photographic evidence.



**APPENDIX**

**REPORT OF THE REGIMENTAL COMMANDER  
OF THE FIRE-PROTECTION POLICE REGIMENT "SAXONY"  
ABOUT THE COURSE AND RESULTS OF THE MASSIVE AERIAL ATTACKS  
ON ROTTERDAM ON MAY 14, 1940, AND THE EXPERIENCES DRAWN THEREFROM**

by

**Hans Rumpf**

**(Translated by Edith H. Molton)**

## Appendix

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The international port city of Rotterdam was the greatest reshipping point in Europe. The city, including suburbs, had a population of about 800,000 and a total area of about 120 square kilometers. The city itself, however, enclosed an area of only 33 square kilometers with a population of about 430,000.

### The Air Defense Fire Service

A civil air defense organization was in existence in the city; however, this organization was, on account of its voluntary character, lacking in unity and discipline. The technical adviser for the civil air defense was the Assistant Director of Public Works for the city, Ingenieur van Dunné. The air defense fire service was a branch of the general civil air defense.

There were no provisions for an increase in fire department personnel in case of air raids. On the contrary, due to the draft for military service, the total number of personnel was decreased by about 300 men. In 1939, the government organized a supplemental air self-protection fire service in addition to the air defense fire service but, up to the time of the attack, it had not coordinated the two services. The self-protection service had as its smallest unit the block fire service. The city was divided into ten air defense districts; every district had about 1,000 to 1,200 city blocks. Every block comprised a group of houses and was of varying size. Every block was supposed to have a block fire service crew of at least six men. The block fire service groups were not given funds to procure fire-fighting equipment; rather, it was left up

to them to get the funds for the purchase of such equipment through collections. The self-protection organization was still in the buildup stage (at the time of the attack). Every now and then, one saw two-wheeled carts for hydrant companies. In well-to-do neighborhoods, some block groups were even supposed to own small motorized fire engines. However, no exact information could be obtained about this equipment; about 10 or 12 were supposed to be in existence. Building fire brigades the way we know them (in Germany) were unknown in Holland. This was due to the high housing standard in Holland, where almost everyone lives in a self-contained housing unit or in one-family dwellings where at all possible. Big apartment complexes did not exist. The idea of fire protection in one's own home was publicized, and "how-to" literature was distributed, but the stage of actual acquisition of equipment was never reached.

#### The German Action to Occupy Rotterdam and the Aerial Attack of May 14

Official reports about this action are not available (to the author). The available testimony, especially about details of the air attack, the time and duration, the number of attacking planes, the kind of bombs used, etc., differs widely. Definite statements obtainable only from Air Force Headquarters in the German Air Ministry were officially requested, but the information has not yet been received. Until it is received, the testimony of the commandant of the air base at Waalhaven Airport at that time, Captain Bochart, is probably the most accurate; it is as described in the paragraphs below.

In the early morning hours of May 10, 1940, German paratroopers, jumping from airplanes, landed at and in the immediate neighborhood of the airport Waalhaven near Rotterdam. After the paratroopers gained control of the airport and broke the enemy resistance, German airborne troops arrived in transport planes. A short time after the landing of the airborne troops, Captain Bochart, with personnel of the air base command, landed and took over the airport. The German forces at the airport came under heavy bombardment by a Dutch howitzer battery, which fired over the city. Also the gunboat "Jan van Gaalen", which was lying in the wet dock of the New Maas, was firing at the airport (see map of city, Figure 1). A short time after the landing of the German airborne troops, English bombers appeared over the airport and bombed the site. When these bombardments ended, about 650 hits on the airport had occurred. The airport was so full of craters and pits that it resembled a moon-scape, and reinforcement of additional German troops by air was virtually impossible. A number of German transport planes which tried to land later crashed in the attempt. The task of the forces that landed at Waalhaven was to push toward the center of the city and to secure it.

The forces that landed at Waalhaven had the strength of approximately one battalion. The German forces crossed the street at Waalhaven and pushed toward the center of town, established themselves on the port side of the Feijenoord district on the island in the New Maas River, and secured a bridgehead on the other side of the great bridge. They were supported by a number of seaplanes that landed near the island.

Since the shelling by the howitzer battery and the gunboat "Jan van Gaalen" did not diminish, on May 12, stukas were ordered to exterminate the gunboat and the battery. Several bombs were dropped on both targets, and, apparently because of this attack, the gunboat and the battery were silenced.

According to the testimony of Captain Bochert, the large air attack of Tuesday, May 14, began at about 1500 hours. According to his observations, several limited fires (prior to the attack) could be seen in the city from the airport. These fires across the Maas from the island apparently originated as a result of the shelling of the "Jan van Gaalen." Whether the Germans used incendiary weapons from the island cannot be ascertained; however, it does not seem very likely that they did since the heaviest weapons of the airborne troops were 7.5 centimeter trench mortars.

Since Rotterdam did not capitulate at the appointed time, approximately 12 to 15 stukas and after that a squadron of bombers were launched to force the capitulation of the city. According to estimates by the air base commander, high explosive bombs of 100 to 500 kilograms were dropped. It is not known at the airport if fire bombs were also used.

A staff officer of the Luftwaffe, who I was told knew the details of the air attack and whom I later asked for official information, informed me that the attack was accomplished by 60 planes with a mixed bomb load of high explosive and fire bombs. In the evening of May 14, the fires, as observed from the airport, seemed to spread a great deal and appeared to join together. There was supposed to have been a strong wind from a southeasterly direction on that day. Above the city of Rotterdam, a tremendous column of smoke developed that was estimated to be 1,500 meters high.

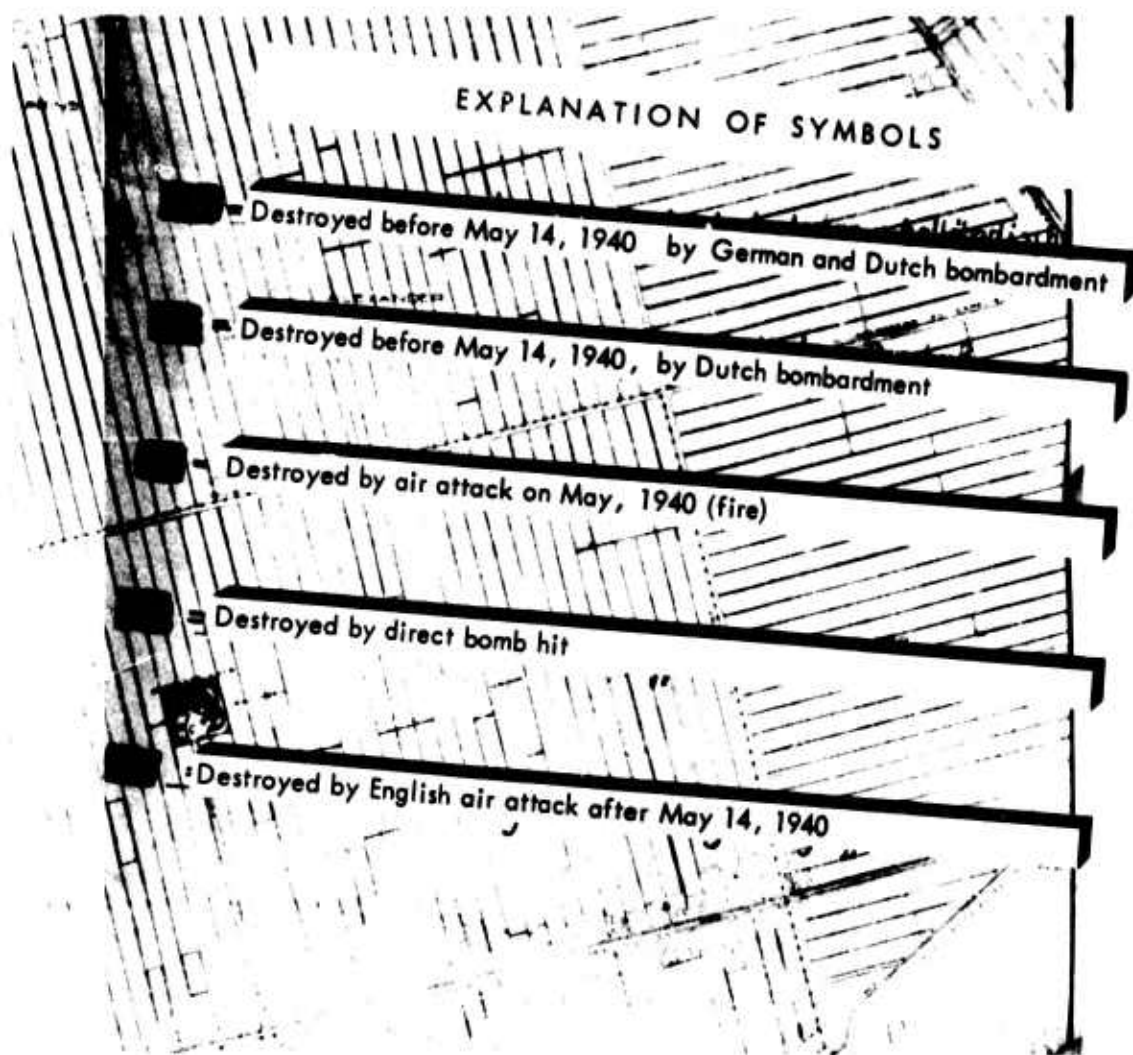
## The Consequences

### Material

In estimating the damage, a differentiation must be made between the fires that developed before the big air attack of May 14 and the



Figure 1 MAP OF ROTTERDAM



LEGEND TO FIGURE 1

fire catastrophe itself that came about through the large air attack (see city map with legend, Figure 1). The first fires started during the night of Friday, May 10, to Saturday, May 11, at Wynhaven and in Wynstrasse, primarily through the battles of the German occupation forces on the island with the Dutch gunboat "Jan van Gaalen" and the howitzer battery.

It is safe to assume that neither side used special incendiary weapons but that the fires were secondary results from the shelling with high explosive shells.

On Saturday morning, at Boompjes, seven to eight larger buildings were burning, and the fire department did not try to extinguish the fires because occasional shooting was still going on in the town. On the other hand, the fires in buildings at Wynhaven were being fought. This action was credited with preventing these fires from sweeping the whole city at that time. After two days of fire-fighting activity, the fire was finally brought under control by Monday night, after the parts of the town within the areas designated by the letter A were burned.

At the same time, great fires raged on the other side of the Maas River across from the island in the installations of the Holland-America Line (Picture 1). At that time, the fire on the 28,000-ton passenger liner "Staatendam" of the Holland-America Line took place, caused by shelling by Dutch artillery. This was the flagship of the Dutch merchant marine (Picture 2). Fire-fighting activities by the fire department were initiated, but no real success in putting out the fire was achieved. On Sunday, May 12, in the morning, an air attack by German stukas on the navy barracks took place, and the barracks were in flames a short time afterwards. Fire fighting was allegedly curtailed because of a shortage of water; the main waterline received a direct hit. Thermal radiation and flying sparks ignited a block of houses on Hoogstraat, and they burned to the ground. Nothing of the navy barracks was saved.

By the evening of Monday, May 13, all fires, large and small, were either burned out or localized so that there was no danger to the city any longer. The prevailing opinion was that the work was done successfully, the fire-fighting task was ended, and no further air attacks would take place. The attack of Tuesday afternoon, therefore, came as a great surprise to the fire department, the city government, and the population and hit them all the harder since they were already lulled into false security and had the wrong notion that a truce had existed since 9:00 a.m. that morning.

The results of the great attack are given as follows by Ingenieur Wanderport, who was director of public works as well as manager of the



**Picture 1 GUTTED WAREHOUSES AND STORAGE DEPOTS OF THE HOLLAND-AMERICA LINE**



**Picture 2 THE GUTTED 28,000-TON PASSENGER SHIP "STAATENDAM"**



extensive salvage department. In an area of 2.6 square kilometers, the following were more or less totally destroyed, with the exception of some buildings, e.g., city hall, post office, stock market, and a skyscraper, which were only partially damaged:

All banks

The outlying branches of the city government

Three railroad stations

All theaters and movie theaters

Several museums

Eighteen churches

All department stores

All hotels in the city except for one

The major restaurants and night clubs

Approximately 6,000 small stores

About 11,000 houses, consisting of 25,000 dwellings

Approximately 75,000 people were without housing. One-sixth of the buildings in the city were destroyed (see Pictures 3 through 8). These data are not accurate since the city government lost all statistics and files in their archives.

#### Loss of Lives

Up to June 15, about one month after the bombardment, during which extensive and intensive debris clearance activity took place and for which service about 18,000 unemployed with 1,400 trucks were drafted, about 445 dead were buried. This number included those who had been found dead under the wreckage or otherwise succumbed to their injuries. The final number of casualties has not been determined since many bodies were consumed in the extreme heat of the fires. It was for this reason that, despite the very high summer temperatures prevailing at the time, there was no danger of disease due to decomposition of bodies, since the extreme heat from the fires had destroyed all organisms. The total loss of civilian lives is estimated to be at most 1,000. The reason for the comparatively small number of casualties, considering the size and intensity of the air attack on a central section of a large city, is explained by the fortunate fact that the attack took place during the lunch hour generally observed throughout Holland, so that most of the employees and workers had left the city for their homes.

During the debris clearance operation, a number of bodies were found in the open streets; these persons obviously did not die from the high explosive bombs but through the heat of the fire. The sequence of events for this was as follows: After the bombardment was over, people fearfully



**Picture 3** VIEW FROM THE SKYSCRAPER SHOWING THE FIELD OF RUINS OF THE DESTROYED INNER CITY (SEE CITY MAP, FIGURE 1). Because the skyscraper is not located in the center, but on the southeast corner of the field of ruins, the borders of the latter to the east and north cannot be seen on the picture.



**Picture 4** VIEW FROM THE SKYSCRAPER



**Picture 5 VIEW FROM THE SKYSCRAPER**



**Picture 6 THE UNDAMAGED DEPARTMENT STORE GERZON AND THE GREAT MAAS BRIDGES  
IN THE BACKGROUND**



**Picture 7 THE OTHER SIDE OF THE MAAS RIVER, AN ISLAND WHICH WAS FIRST OCCUPIED BY OUR PARATROOPERS**



**Picture 8 OVERHEAD RAILWAY AND DAMAGED AREAS OF THE INNER CITY NEAR THE HARBOR**

stayed too long in the shelters and basements, and the developing fires cut off their avenues of escape. Before they could get out of the burning streets into the open air, they succumbed to the thermal radiation. The bodies were found in a partially charred or mummified state. This is an occurrence that was well known before from great city fires of former times; for example, from great fires caused by earthquakes such as the one in Japan in 1923 which took thousands of human lives. The civil air defense (self-protection) will have to take these experiences into consideration.

#### The Organization of the Rotterdam Fire Department

The international port city of Rotterdam, with its far-flung harbor installation, wharfs, storehouses, and warehouses, which were larger and more extended than those in Hamburg, was protected against fire by a very deficient and incomplete voluntary fire department. It is hard to understand why this setup was allowed to exist as long as it did, especially as it was known in Holland, as well as the rest of the world, that the organization of the Rotterdam fire department was insufficient and fires often went out of control to a degree that was both unusual and unnecessary.

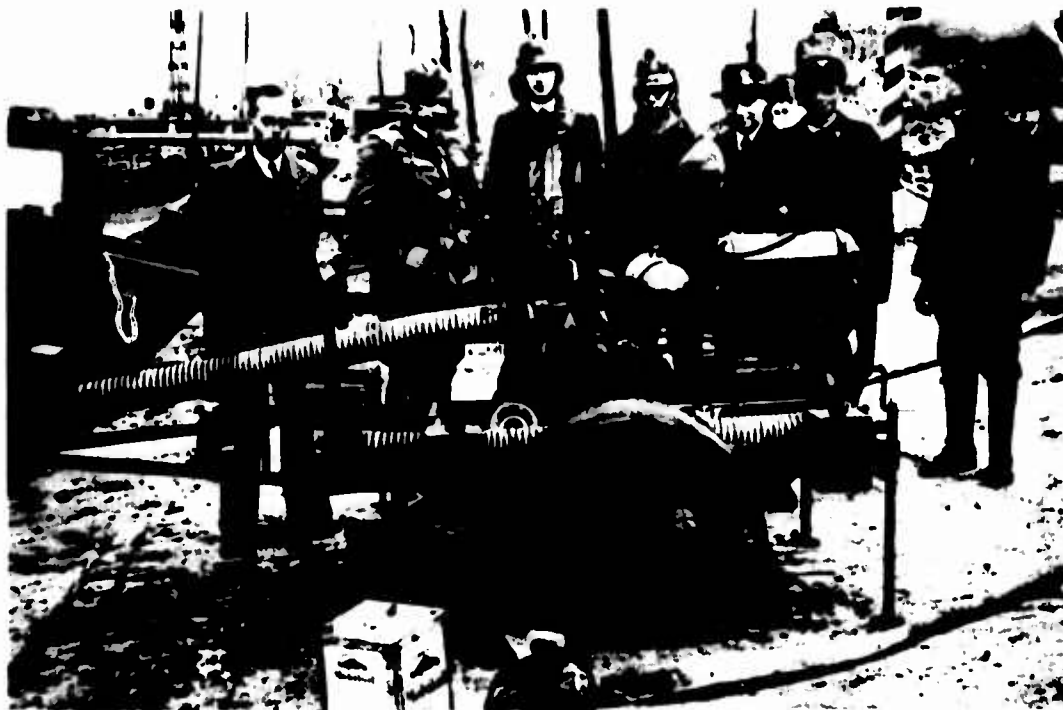
Repeated attempts to convert the voluntary fire department into a professional fire department always met with resistance from the very influential voluntary organizations and their followers in the city council. Allegedly, the very energetic Lord Mayor Zimmerman, who worked for this change before the war resigned before the end of his term because of this conflict. The obvious conclusion, that the volunteer fireman was opposed to a change because of the additional income, is without foundation. The leaders of the fire brigades did not receive any compensation, and the men received compensation only for drills and actual fire fighting at a very minimal rate of 1/2 Dutch guilder per hour. In addition, bonuses of 60 to 20 Dutch guilders were given to the three fire engines appearing first at the scene of a fire. These bonuses were only granted for very large fires, however, which took place only about 45 to 50 times a year. These bonus funds were used for community affairs. Therefore, it seems possible that the parts of the population from which the voluntary firemen were recruited considered the fire engines to be some sort of toy, did not recognize their responsibility, and screamed bloody murder every time an attempt was made to deprive them of their toy. Since the leadership of the voluntary fire department consisted mostly of merchants, there is the suspicion that the fire protection for the city was purposely kept weak for the financial betterment of the merchants--a philosophy that was rampant in the port cities, including those in Germany during the Weimar Republic--whose plans would have been uncovered by an effective professional fire department. There is no other conclusion that

would explain the primitive organization of the voluntary fire department, which was way below the average of those in the other Dutch cities and which was especially inferior to good German voluntary fire departments.

The total fire-fighting force comprised about 1,500 men. Through drafts to the military forces, this force was depleted to less than 1,200 men. No replacements were recruited for the men lost to military service, and reserves were not used. The chief of the voluntary fire department of Rotterdam was the merchant prince W. Poortman (with the title of president). There were 12 additional officers (captains) who were not assigned to any special district or to any special task. In case of fire, the captain living nearest to the fire site was to be notified; if he was not at home, the next one was to be notified. The captains were not in uniform; they were designated by a hat-band of oilcloth with the word "Brandmeester" on it (Picture 9, third from the left). The twelve captains met from time to time under the chairmanship of the president to discuss general problems, pass on rulings, and regulate service. The men of the companies had drills six times a year, the drills lasting one hour.

The fire-fighting equipment consisted of seven motorized fire engines of American make (Ahrens-Fox, Cincinnati); performance was 3,800 liters per minute at 8.5 atm with a capillary rise of 4 meters (Pictures 10 and 11). These fire engines were not driven by members of the voluntary fire department but by truck drivers of the municipal motor pool. These fire engines were also kept in the municipal corporation yard. There were also two hook-and-ladder trucks of German make. The technical personnel for these vehicles did not belong to the voluntary fire department. They could only bring the fire engines to the fire site and handle the hooks and ladders, while the laying of hose lines and using of hoses was the sole and established privilege of the voluntary firemen. Only when hoses were directed over hook and ladder trucks did the voluntary firemen leave the somewhat dangerous undertaking to the technical personnel. Of the technical personnel, about 24 men were on call during the day and 8 were on call during the night. Four of the fire engines were stationed on the right bank of the Maas, and two were stationed on the left bank. The seventh fire engine received a direct hit by a high explosive bomb while moving out to a fire and was so badly damaged that it could no longer be used. The available fire-fighting equipment also included three emergency rescue vehicles that burned at the depot on May 14.

Besides the above equipment, the municipal government had six police boats in readiness to assist at large fires. These had built-in fire hoses. They were under the jurisdiction of the harbor master and did harbor police duty (Picture 12).



**Picture 9 A 1,000-LITER SMALL MOTORIZED FIRE ENGINE (DUTCH CENTRIFUGAL PUMP WITH FORD MOTOR)**



**Picture 10 AMERICAN MOTORIZED FIRE ENGINE (AHRENS-FOX)**





**Picture 11 AMERICAN MOTORIZED FIRE ENGINE (AHRENS-FOX)**



**Picture 12 FIREBOAT — 15 METERS LONG, 2.5 METERS WIDE. 100 horsepower diesel drive;  
150 horsepower diesel pump motor — 3,600 liter per minute capacity.**



At night only two boats were in service. If the boats were used at a fire site, the harbor master assumed command over the fire-fighting operations. The pumps of the fire-fighting boats had a capacity of 2,500 to 4,000 liters per minute at 8 atm (Picture 13). Throughout the city, as equipment for the voluntary firemen, 61 so-called serpentine wagons (literal translation) or hydrant carts were stationed in small firehouses (Picture 14). These wagons were the vehicles or carts that were equipped with a standing pipe, 160 meters of hose, and a stationary ladder and were used first in a fire (Picture 15). At a hydrant pressure of 2.5 atm, the water could not always reach great heights. There were only 14,500 underground hydrants; fire hydrants above the ground are unknown in Rotterdam. The hydrants were marked with a blue enamel plate with a white arrow pointing downwards at a 45-degree angle. The hydrant was located where the extended tip of the arrow intersects the ground at a right angle to the house front, almost always on the sidewalk (Picture 16). In the old part of town, the distance between fire hydrants was approximately 500 meters; in the new part of town, it was approximately 1,000 meters. Thirty-four fire stations had recently been equipped with small fire engines as additional fire equipment. They were motorized and had a capacity of 1,000 liters at 5.5 atm. The other 31 stations had only hand pumps to fall back on, which were declared obsolete in 1928 (Picture 17). The small motorized fire engines could be dismantled from the carriage and, with the help of a detachable axle, could be pulled by hand. This contraption was built by a Dutch firm which apparently had little experience with fire engines. It consisted of a poorly constructed centrifugal pump with a Ford motor (Picture 18). Also belonging to the engine were a 200-meter hose, a standing pipe, and four flash hoses.

Every fire station had a complement of 6 captains and 20 men, who lived near the station. By arrangement, it was supposedly ascertained that a minimum crew was always available and in readiness.

There were no uniforms; the majority of captains and men did their fire-fighting duty in their civilian clothes with the oilcloth band on their hats that showed by color and number the rank of the person and the station he was assigned to. Only the captains of the fire-hose crews had protective clothing, with a sort of fire helmet and slicker (Picture 9, center).

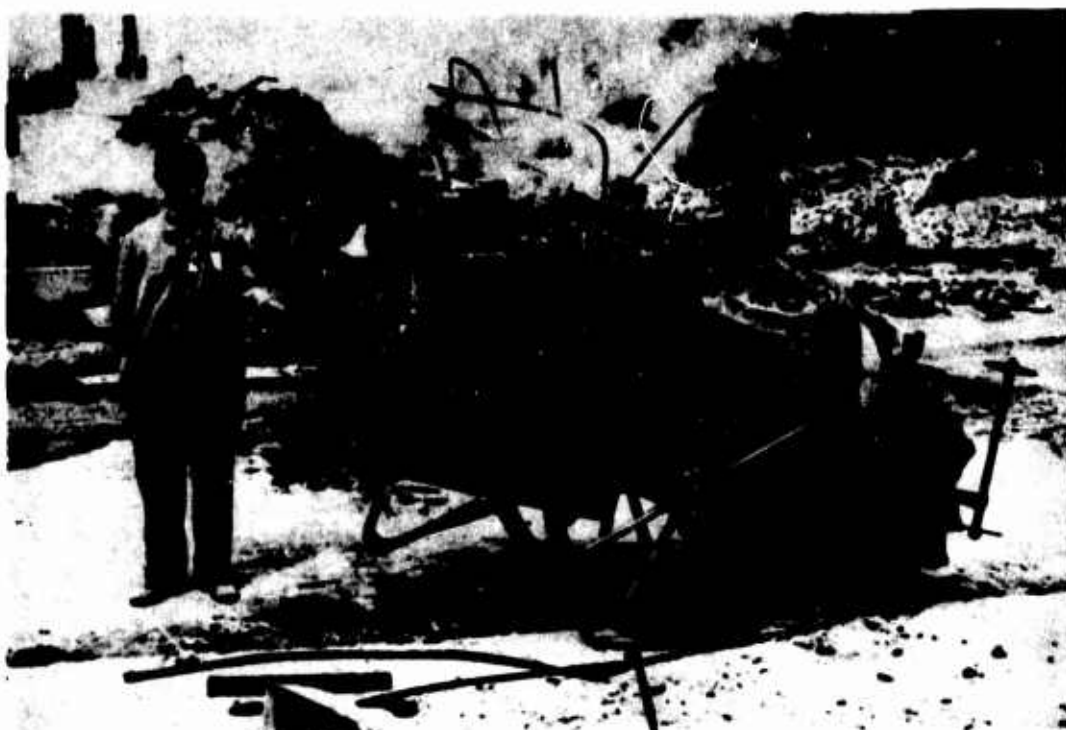
An alarm system with public fire alarm installations did not exist in Rotterdam. Alarms had to be given over the telephone or by word of mouth to a fire station. There was an emergency telephone number--No. 99--that switched the call to a central alarm station, which took care of transferring the call to the proper fire station. At any one time, five persons belonging to a serpentine brigade were supposed to be connected by an alarm to their homes. Then these five had to alarm the rest of their men by



**Picture 13** TURNABLE PIPE AND DISTRIBUTOR BOX OF THE FIREBOAT (ENGLISH MAKE). Nozzle of turnable pipe 50 millimeters in diameter; eight connecting sockets — 62 millimeter.



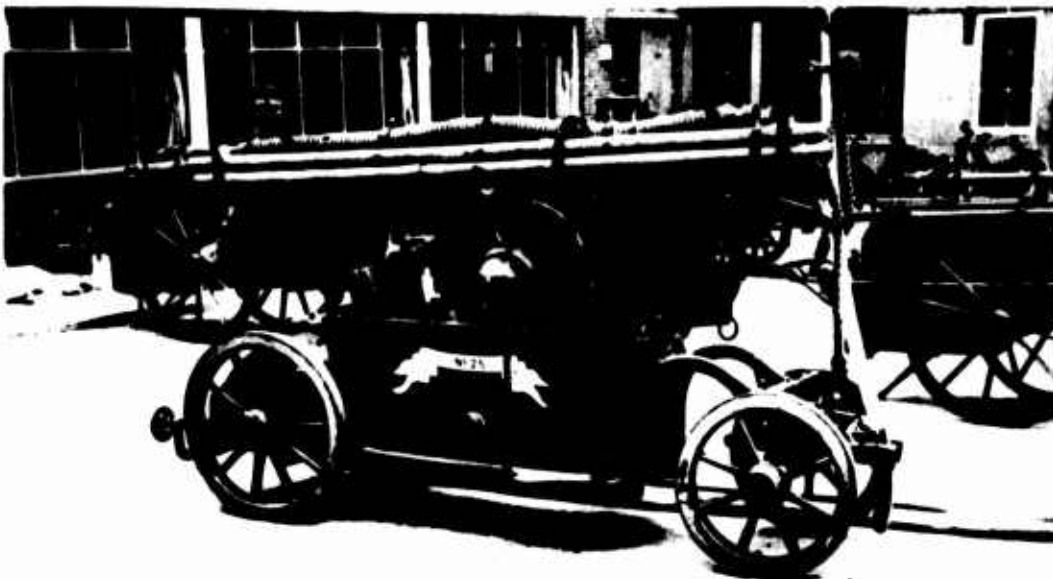
**Picture 14 ONE OF THE 61 FIRE STATIONS (HOSE TRUCK STATIONS)**



**Picture 15 HYDRANT CART (HOSE WAGON), THE MAIN FIRE-FIGHTING EQUIPMENT OF THE ROTTERDAM VOLUNTEER FIRE DEPARTMENT**



**Picture 16 IDENTIFICATION OF UNDERGROUND FIRE HYDRANTS**



**Picture 17 OUTDATED MANUAL PUMP AND PRESSURE HOSE EQUIPMENT**  
Thirty-one pieces were reinstated for the Civil Defense Fire Department



**Picture 18 THE 1,000-LITER SMALL MOTORIZED FIRE ENGINE (BICKERS CENTRIFUGAL PUMP WITH FORD MOTOR)**

calling the central alarm. They did not wait till the brigade was at full strength but moved out as soon as there were enough men to pull the fire wagon. According to information from the captain of the fire department, help from nearby residents or passers-by was gratefully accepted. The site of the fire was written on a blackboard at the station so that the men who arrived later knew where to go.

The following moved out to fires:

To small fires:	2 serpentines
To middle-sized fires:	4 serpentines
To large fires:	6 to 8 serpentines

At large fires, motorized fire engines were on request. Before the May 14 attack, there were available 15,500 meters of 66 millimeter hemp hose and 25,000 meters of 45 millimeter hemp hose altogether.

The deficiencies and drawbacks of such an organization can be clearly seen. The organization can be compared with the deplorable conditions in the large cities of Germany before the founding of a professional fire-fighting service, where enormous fires (as for instance the great fire of Hamburg in 1842) forced the establishment of professional fire departments. It is obvious that an outmoded and insufficient fire-fighting organization of this kind could not protect the city and the harbor installation in case of an aerial attack and that a catastrophe was unavoidable.

#### Efforts of the Voluntary Fire Department of Rotterdam After the Great Aerial Attack of May 14\*

Poortman states that on the Tuesday before the great bombardment, all stations had a full complement. He experienced the aerial attack in his home. After the attack was over, he went to the city district of Kralingen, which was hit by the attack and was the closest to his home. In this district there were numerous fires immediately after the air raid. The water supply failed very early during the air raid when one of the main waterlines leading from the waterworks to the city was broken by an accidental hit by a bomb. Within two hours (but probably much later) the damage was supposedly repaired by the water department. Since there was little water available at first and the pressure was very weak, the fire fighting that was done was carried out with the old hand hoses. At Kralingen, Poortman observed that numerous fires, perhaps at a hundred different sites, were starting in the whole inner city.

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\* Compiled from data furnished by the President of the Department, W. Poortman.

Like Poortman, the other captains of the voluntary fire department went to the fire sites immediately after the bombardment. By noon on Tuesday, all fire stations were manned with about 50 percent of their complements. After the air raid, the rest of the men appeared at their stations. At the time of the alert before the attack, there were 500 men on the right bank of the Maas and approximately 400 men on the left bank. After the attack, the right bank of the Maas had 1,400 to 1,500 men available, who partly came from the other bank of the Maas to help out. In addition to these, it is estimated that approximately 1,000 persons from the general population offered their assistance, part of them coming over from the left bank using the bridges. These extra volunteer persons were drafted to help with various tasks, e.g., laying of hoses. In the district Kralingen to the east, a purely residential district, according to Poortman's testimony, there were simultaneous fires at about 30 to 40 sites. Fire fighting was taken up by two large fire engines and five to six small motorized engines. It was possible to hold down the fire to Oude Dijk. This success was apparently due to the fact that Oude Dijk is a very broad avenue.

According to the testimony of Poortman, the method of fighting delaying actions and creating sheets of water (with the hoses) to keep the fire from spreading to the other side of the street was not used. On the west side of this fire district (see city map, Figure 1), the fire department of Amsterdam worked alongside and helped to keep the fire from spreading. (See eyewitness account of Fire Marshall Nymeijer of the municipal fire department of Amsterdam, p. A-35.)

In the old part of the city, due to the extremely narrow streets, the fire soon spread to such an extent that the fire brigades could no longer advance through the burning streets. At many points, fire-fighting operations were halted altogether because there was the danger that, with further spreading of the conflagration, the retreat would be cut off for the firemen. Poortman implies that in this part of the city the fire department was unable to function at all because the fires spread so quickly and the fire brigades had to retreat before they could mount an effective fire-fighting attack.

Eventually catastrophe overtook the city, which raged from Tuesday till Friday. As it became apparent that it was impossible to contain the fires in the inner city, the fire brigades retreated more and more to the western and northern city limits. For instance, at the Westersingel and Schiedamsche, single positions were taken up. The out-of-town fire fighters supposedly worked on the western end of the city, but details about these operations are not available.

From the observations of Poortman, it can be deduced that the men of the voluntary fire department soon were totally tired out and demoralized. They were dismissed with the order to return after 12 hours. Some left their positions on their own initiative. No records exist to show if the men returned to their posts after the recess. It is apparent that after the 12-hour recess, the captains lost all direction over their men, and every man went where, in his own opinion, he was most needed.

The out-of-town forces, which the Lord Mayor requested for assisting in the fire fighting, were not given instructions to assemble at any one central spot where they could have been tactically deployed to locations where most needed. The out-of-town men arrived and tried to find a captain who could tell them how things stood and where to go to help out. Since this was not possible in almost all cases, the men acted on their own initiative and went to help where they thought it might do the most good.

Apparently on the instigation of Poortman, the Lord Mayor of Rotterdam called on all the large fire departments of The Netherlands by Wednesday morning to come to the assistance of Rotterdam. Fire brigades from Amsterdam and police fire-fighting brigades from Den Haag, Haarlem, Leiden, Delft, Utrecht, Schiedam, Gouda, and Schiebroek arrived. Every department sent one or two engines. Central direction of the fire-fighting operations was nonexistent when the groups arrived. The central alarm station that had been designated as headquarters ceased functioning by Tuesday afternoon, after which time any communication with the different stations was lost and contacts among the fire engines and from captain to captain also ceased. An alternate headquarters did not exist. The stations suitable for possible emergency headquarters were all destroyed by fire.

It is worthy of note that during the night from May 18 to 19, an additional conflagration developed in Rotterdam. During this night, the English attacked the southeast part of the city behind the bridges and set large fires (see city map, Figure 1). Among the targets, a large petroleum depot was hit and immediately went up in flames. There were numerous explosions in which burning barrels were thrown into the air, carrying the fire to the roofs of neighboring structures. Three large fire engines and twelve small fire engines converged on the area. There was plenty of available water from open reservoirs. After a big city block burned out, further spreading of the fire to the neighborhood was prevented in this instance.

The president of the Rotterdam voluntary fire department submits the following reasons for the size of the catastrophe:



1. Water shortage due to a direct hit on the main waterline
2. Strong southeasterly wind
3. A most unusual drought for The Netherlands

### Losses of the Rotterdam Fire Department

#### Personnel

Two captains were killed (one during the drive to duty in Waalhaven and the other while fighting the fire at the navy barracks). One sergeant was killed at Waalhaven, and one fireman was killed when a building collapsed. One sergeant was injured on the drive to Waalhaven, and seven or eight firemen were injured while fighting fires.

These losses were all incurred right before or right after the big air raid on May 14. While fighting the conflagration on May 14 and on the following days, no casualties were incurred.

#### Material

One fire engine on the drive to the fire at Waalhaven was shot at and burned by German troops, and four fire wagons were abandoned and burned. The headquarters was destroyed by fire. Three rescue trucks were burned at the depot. The exact number of serpentines lost through fire or collapsing buildings cannot be ascertained one month after the event.

Approximately 25,000 meters of hose were lost, mostly because when the brigades changed position the lines to the rear were not secured. Also, a large amount of hose burned in a storage depot.

Great losses of hose were also incurred because heavy fire engines raced full speed across the hoses. Later on, the German troops put planks over the lines and filled the spaces between plank and hoses and the street and hoses with sand. Also, after the capitulation of the city, the vehicles went at a much slower pace and more carefully.

It proved to be extremely difficult to obtain a true picture about the events during and shortly after the air raid regarding the actions of the fire department, and this was accomplished only in part. It is natural, in the event of the magnitude of the fire and damage sustained that was comparable to a natural disaster, that the eyewitness accounts differ considerably from one another. In addition, there is a pronounced suspicious attitude on the part of the Dutch authorities, who obviously

hold back on facts and try to gloss over the apparent shortcomings of the civil defense organization. The following eyewitness accounts should be read with these facts in mind, and it should be borne in mind that they are to be used with caution.

#### Eyewitness Accounts

Ingenieur W. Vanderpoort, born January 27, 1895, residing at Vijverlaan 43, Rotterdam, Chairman of the Board of Public Works, Department of the Municipal Technical Services:

I left City Hall on May 14 at between 5:30 and 6:00 p.m. In the Coolsingel at that time there were fires only at the Coolsingel Hospital, the Doelen, and one or two buildings next to Atlanta. I am of the opinion that the district to the east of the City Hall could not be reached.

Up to this time, I was at the City Hall and had taken over command of the Air Raid Shelter. During the bombardment, there were about 500 persons (civil servants and soldiers who were on watch at City Hall) in the shelter. As soon as the danger outside was over, I gave instructions to those present as to how to leave the shelter. Because the exits are very complicated, detailed instructions were necessary. Through no fault of mine, the people were sent back to the shelter shortly after they left because of a false alarm of another attack. I was able, through persuasion, to prevent a threatening panic. The exit on the Doelen side was, after the second clearing of the shelter was prevented by a false alarm, no longer usable because of the danger of collapse. The exit to the post office side is very involved, with long dark corridors and corners, and I had soldiers mark the exit route with electric flashlights. At this time, there were about 400 people left in the shelter. For the third time, people were sent back from the exits; and only on the fourth try, after about an hour and a quarter, was it possible to clear the shelter.

I then made the rounds in City Hall to see what I could do to minimize further danger to City Hall. I had two civil servants with me. I unrolled a fire hose, but there was no water pressure left. Then it took some time to get together ready cash, and finally the three of us left by auto between 5:30 and 6:30 p.m. We went to the

Mathenesserplein and then via tunnel, Walenburgerweg, and Bergweg to the east part of town. After a brief visit to my home at Kralingen (Vijverlaan), I spent several hours in the district of Kralingen; this was at about 8:00 p.m.

There were many small fires. Several of the narrower streets were no longer passable because of heat and smoke, although many undamaged blocks of houses remained. One large fire engine was working, apparently in the Waterloostraat. At several points, voluntary firemen with the help of civilians were using the manual fire hoses.

Next morning, Wednesday, May 15, I left my house by bicycle at 4:30 a.m. to get to City Hall. It took me a long time to get there because I stopped several times on the way to give instructions. I arrived about 5:30. When I arrived, the Trivoli Restaurant, Trivoli movie house, and the business building Van Reeuwijk were still relatively undamaged; there were no fires in these buildings. (These are all across from City Hall.)

Because numerous windows were broken in City Hall and since there was a decided danger that the buildings opposite would catch fire, as soon as several people had arrived at City Hall, around 8 o'clock, I ordered them to take down all the curtains. This proved to be correct because by 8:30 a.m. the Trivoli Restaurant and Trivoli movie house had caught on fire. The people from Van Reeuwijk had tried to remove furniture and rugs from the offices. Approximately half an hour later, the Van Reeuwijk building caught fire too. I had tried since early in the morning to reach the fire department through couriers, because there were no phone connections. However, in this I was not successful. The shower of sparks from the Trivoli and from Van Reeuwijk was constantly shifting due to strong air currents and extreme heat.

On Wednesday at 8:00 p.m. I left City Hall by bicycle. I had the impression that the intensity of the conflagration in the inner city had diminished as compared to the morning hours.

I cannot give further information because on the following day I was in the City Hall organizing cleanup operations.

I attended the speech by Colonel Rumpf before General Dalugue on June 7. After the speech, there was a discussion in which the opinion was expressed that if the fire department had better overall directions and central leadership, it should have been possible to limit the extent of the catastrophe. I was able to explain to General Dalugue briefly that, in my opinion, this is not the case, and I explained that I am convinced that control over the fire sites was not possible and that a central direction of the fire department was likewise impossible. It was impossible since passage through many streets was impossible because of fallen debris as well as the heat and smoke. Neither was the organization of an alarm system possible in my opinion.

June 13, 1940

(Signed) W. Vanderpoort

Ingenieur L. J. van Dunné, born February 27, 1887, residing at Kralingsche Plaslaan 176, Rotterdam, Director of the Municipal Technical Services Department and Director of the local Civil Defense:

The air attack started on Tuesday, May 14, 1940, at about 1:00 or 2:00 p.m. Dutch time and ended at about 4:00 p.m.

At this time I emerged from the shelter at City Hall and found the street in front of City Hall deserted. Together with several other gentlemen, I tried to get to the east end of town by automobile. Several big buildings, e.g., Doelen, Coolsingel Hospital, and buildings next to Atlanta, were on fire. When we got to Van Hogendorpsplein, it became apparent that it was impossible to get to that part of town. So we turned around and went to Hofplein. There the newspaper office and the railroad station Hofplein were on fire. We continued on over Pompenburgsingel, Goudschisingel, Gedempte Slaak, Lusthofstraat, Avenue Concordia to Van Somerenway and saw fires to the left and right of us.

The next morning, Wednesday, May 15, at about 10 o'clock, I tried to get to the City Hall with the Lord Mayor, but it was impossible to get to City Hall as all the streets leading to City Hall were impassable because of fire.

We had a conference and decided to go to the Power Department Building in Rochussenstraat, where we took up headquarters for the rest of the day.

June 12, 1940

(Signed) L. J. van Dunné

Mr. Schaefer, a German citizen, about a fire outside the major damage area at Schieweg 110-118, as seen from his house at Schieweg 99a:

The building was a townhouse in the usual Dutch building style, with large glass windows out to the street. The rooms facing the street and those in the back of the house are connected through an archway. In the middle of the townhouse, a bomb had fallen.

The fire started at about 1530 hours German time (May 14). It allegedly started in the top story of the three-story house. It is suspected that petroleum cookers which were destroyed while in use carried the fire to the furniture.

A portable fire engine with two hoses was in operation. The water was taken from a nearby canal. Toward 1900 hours, the fire, despite the efforts of the fire fighters, had spread to three other houses. Now a fire engine, supposedly from Schiedam, appeared at the canal. By using both the fire hoses, the fire was cut off. At this fire site, it was easy to observe the flimsy Dutch building methods which encourage the spread of fire. It was noted that in this district the bombs did not hit through the roof but struck through the outer walls or windows.

At this site a conflagration could easily have started had not the larger fire engine appeared at the last moment.

June 8, 1940

(Signed) Schaefer

Warehouseman van Roojen (van Roojen works for Mr. Schaefer, Schieweg 99a; he is considered trustworthy by Mr. Schaefer):

On May 10, toward 6:00 a.m., three to four German seaplanes landed on the Neue Maas River. People ran out of neighboring houses to watch the landing of the troops. At about 7:30, the soldiers arrived at the Boompjes and occupied the northern part of Rotterdam. They advanced into the city, and at about 8:30 they were met by Dutch soldiers. A battle ensued, in the course of which the Dutch soldiers retreated. By Friday night, the German troops retreated to the bridgehead in North Rotterdam, which they continued to occupy. On Boompjes fire had broken out at various points as early as Friday afternoon, and this eventually spread to the whole district. The first fire erupted at the Maas Hotel, where German paratroops had barricaded themselves. The fire started through the bombardment of the gunboat "Jan van Gaalen." On Friday night, the fire spread to a large storage shed on the bank of the Maas, where great amounts of oils and fats were stored. The voluntary fire department was nowhere in evidence. Later on, some voluntary firemen with hand pumps and the block fire department with a small portable fire engine arrived. The hand pumps used water from the hydrants and were under very low pressure. The portable fire engine used water from the inner harbor. These forces made a valiant effort to check the raging fire but were powerless to prevail.

June 8, 1940

(Signed) van Roojen

Mr. H. L. Brusse, born August 24, 1877, residing in Rotterdam, Oostzeedijk 119b, now Aelbrechtskade 49d, Secretary to the Board of the Voluntary Fire Department in Rotterdam:

At the time of the air raid, I was at my apartment at Oostzeedijk. We had just finished our noon meal when the first bombs dropped. A house across the street from our home was hit by a bomb. The house was totally destroyed down to the bottom floor. It did not burn, however. After about half an hour, the mass of debris suddenly started to burn and the fire started spreading. The fire department had not arrived. At that time, most of the people were still in the shelters or in their homes. The streets were practically deserted. One saw only police and military guards. I could not call the fire department because my telephone stopped working at the beginning of the raid. The fire that started across the street eventually spread to about forty houses. Since all the windowpanes in my home were destroyed,

I took my wife to a garage in order to leave from there. This, however, was no longer possible since no vehicles were available.

At approximately 1600 hours I left my home. When I returned at about 1920 hours, my home was completely burned out. Next to my house is a carpet factory where the fire had started. The fire must have spread from there to my house and to some of the other neighboring houses. When I returned at 1:30 a.m., the fire had spread to the inner city. By that time, about 40 houses on both my side of the street and across the street were on fire. The fire also spread along the street out of the city toward Kralingen. In my opinion, the wind must have shifted during the evening. I cannot testify as to the exact direction of the wind. All I can say is that a strong wind, almost a storm, was blowing. The fire stations near my home, together with all their fire-fighting equipment, were destroyed by fire. The crews of two other serpentine stations nearby were ordered to the fires at Kralingen and did not reach the fire sites at Oostzeedijk. I could not ascertain until midnight if the center of the city was hit by fire too. When I went, shortly after midnight, almost to Oostplein, I saw that the whole inner city was aflame and the fire was spreading all the time. In the night, two large fire engines were active at Oudedijk, and there the fire was brought under control. The next morning I tried to get to the city, and I finally succeeded by using detours. I saw that the whole inner city was on fire, and most of it was already burned out. Fire-fighting brigades were no longer active in the inner city. It was impossible to stay there anyway and try to fight the fire; it was hopeless. The fire brigades were more active on the outskirts.

June 14, 1940

(Signed) H. L. Brusse

Director Ingenieur B. Scheur of the Municipal Water Department, Rotterdam, and Ingenieur J. J. B. Bijker, Assistant Director of the Municipal Water Department, Rotterdam, about the failure of the water supply on Tuesday, May 14:

The Waterworks, Rotterdam, which are situated on the left bank of the Neue Maas River (see city map,

Figure 1) has a 1,250 millimeter waterline and three 600 millimeter waterlines across the Honingerdijk to the city. Besides this, there is one 1,250 millimeter line along the bank of the Maas (Oostmaaslaan). This line is to be used as a reserve line and was not ready till the beginning of April. Two of the 600 millimeter waterlines are laid through the Maas River and supply the water for the part of the city located on the left bank of the Maas. These two lines are about 1.2 kilometers apart. At this time, only the 1,250 millimeter line at Oostmaaslaan and one 600 millimeter line, which supplies the eastern part of the city, are in operation.

On Sunday, May 12, two lines (600 millimeter) were completely destroyed during the attack on the navy barracks at Oostplein. It was not possible at first to repair the line. We directed our efforts to localize the damage by shutting of locks.

On Tuesday, May 14, one 1,250 millimeter main pipe was destroyed by a direct hit early during the attack. From the charts at the waterworks, it can be seen that at about 1510 hours the pressure was reduced to zero.

The steam turbines were running empty and had to be stopped. The electric pumps, which are used for peak periods, were in operation but stopped when the electricity failed. After 15 minutes the electrical power was restored, and the electric pumps were put back in operation. Through a big eruption of a Venturi hydrometer, it could be ascertained that the respective strong line had been hit; and through the shutting off of this line and through the throttling of the other lines, the water pressure was soon made to rise so that the steam turbines could be put back into operation. The damage spot on the main waterline at Honingerdijk was located after about 45 minutes through the closing of some of the locks. A damage spot on a branch of the other 1,250 millimeter line, which at that point has a diameter of 800 millimeters, could not be localized till the next morning, since the trouble spot could not be found due to the enormous conflagration during the night. Therefore, pressure for the other 1,250 millimeter line was throttled. In the east (Kralingen) the line was not throttled and had full pressure.



On Tuesday afternoon at 7:30 p.m., Ingenieur Bijker went to the city on his bicycle and notified the various street companies that pressure was restored and fire-fighting activities could be resumed.

It is worthy of mention here that on Saturday, May 11, at about 2000 hours, the water tower of the water-works was set on fire by mortar shells shot out by German troops from the district Fejin-Nord. The wooden casing of the big dome of the water tower above the water tank and the wooden circular stairs leading up to it were burning. The fire was fought by the department's firemen who had a fire engine mounted on a gun carriage. Also the voluntary fire department of Rotterdam was called in and worked with a large fire engine. After about an hour, the fire in the dome of the water tower was entirely extinguished.

The water department of Rotterdam uses steel pipe for the bigger pipe lines. Ingenieur Bijker reports that these steel pipes proved most valuable as opposed to the cast iron pipes, which, with a hit from a mortar shell, crack due to earth tremors. A high explosive bomb struck near one of the 1,250 millimeter lines and left a bomb crater of about 10 meters in diameter. About 5 meters away from the edge of the crater, a steel pipe was located about 1 meter under the ground. This line did not crack or break from the shock of the explosion. On the other hand, it was observed that a much less powerful high explosive bomb cracked a cast iron valve due to the shock. The water line developed a leak, and the damage was found much later accidentally.

Ingenieur Bijker also gave his personal observations on his trip to the city when he gave the word that the waterlines were repaired and fire-fighting operations could commence. He could hardly find anyone engaged in actual fire fighting and often tried, without success, to send messages to various fire brigades. He has the feeling that the fire department as well as the general populace lost their heads completely and that hardly any real resistance to the fire was evidenced. He had the impression that only the more intelligent elements of the population thought of fighting the fires and tried to contain the fires. This was mainly the case

with the block fire brigades, and he could find serious efforts by them at many points.

Bijker could not or would not give any reason for the inaction or inability of the voluntary fire department. He refused to give his observations on this score as he felt that they were of a strictly personal nature and he only felt qualified to give testimony on his own specialty-- water supply. Bijker, by the way, is of the opinion that the fire could not have been caused by high explosive bombs. He claims that he saw among the duds, which he feels numbered about 100 (this estimate confirmed by others), fire bombs which had a cylindrical shape.

Mr. L. van der Tas, graduate marine engineer, captain of the voluntary fire department of Rotterdam, residing at Rochussenstraat 67a:

At the time of the air attack on Tuesday, May 14, I was at my home at Rochussenstraat 67a. I had ample opportunity to observe the attack from my window and could see that at various points large fires started immediately. I then went in front of my house. At around 1610 hours, a young man arrived and told me excitedly that the hospital at Coolsingel was hit by a bomb and set on fire. He asked for vehicles for the transport of bedding and bandages, since otherwise they would catch fire. I drove there and took care of the matter. With the help of a small Opel passenger car, we were able to save some of the material. In front of the hospital, a large line of automobiles was already assembled to transport materials. Afterwards I devoted my efforts to fighting the fire and especially so on the following days. Tuesday afternoon while in the city, I noticed no fire-fighting equipment and no fire brigades in operation. I assume that these were occupied in the north or east. I had no possibility of establishing communications with the fire stations and the other fire captains since the central fire station was destroyed. A centralized command was out of the question since the area of the fire was so extended and the instruments for communication were destroyed. On Tuesday afternoon I noticed that panic was beginning to take hold of the population. Families with small children and all their household belongings roamed the streets and tried to get out and save what they could of their movable belongings. To fight the fires apparently did not occur to anyone. On the other hand, in the west end of the city, people tried to get to the city to help fight the fires.

In my opinion, fire brigades did not arrive till later, at what time I cannot say.

(Signed) L. van der Tas

(Note: If all 12 fire captains of the voluntary fire department of Rotterdam behaved as this one did, then many things become clear.)

Mr. H. van der Burg, Director of the von der Meer en Schoep's Bakkerijen (Bakeries), captain of the voluntary fire department, Rotterdam, residing at Bergsingel 93:

At the time of the air attack on Tuesday, May 14, I was at my home. I saw from the top story of my house that the neighborhood of the jail was on fire. I went on foot to the jail. I made sure that the jail was not burning, but the surrounding streets were aflame. I saw that two small fire engines were working, taking their water from the Noorsingel. The wind was driving the fire toward the jail. The voluntary fire department was able to prevent the fire from reaching the jail. Since the fire threatened to spread, I ordered a large motorized fire engine. I did this by sending a boy with a bicycle to the station where the engines were stationed. The fire was fought by hosing the burning buildings from the street and also from within. The fire-fighting activities continued all through the night and the next day. Altogether 30 houses in that block were burned. I also went to several other sites where big fires had started. At one location I gave orders--there were 10 houses on fire--not to fight the fire from the center, but to stop the fires from spreading on the edges. When I got to the Rechter Rottekade (about 1930 hours), I saw that the whole inner city was on fire. In my estimation, the fire spread toward the Maas. During the night the wind shifted approximately from a northwesterly direction. Later on I went on a large fire engine to the Schiekade Hospital, which was endangered by spreading fires. I was successful in containing the fire with the help of four hoses. Also a fire engine reported to the site from Schiebroek and one from Den Haag, which I dispatched to help protect the hospital. Each one of these engines had four hoses. I was in charge of the district near the hospital till Wednesday at 7:30 a.m. and did not leave my post till that time. The voluntary firemen were working with the "baby hoses," and the big motor hoses were manned by volunteers from the civilian

population. On Wednesday at 1230 hours I sent Captain Kruis to Delft in a Red Cross vehicle to requisition another fire engine. This engine arrived at approximately 4 o'clock.

(Signed) H. van der Burg

Fire Captain Nymeljer of the Professional Fire Department of Amsterdam (On May 15 at 2:00 p.m. the mayor of Rotterdam asked for help by long distance telephone; one fire engine of 1,500 l/min was sent with a complement of 10 men.):

When I arrived in Rotterdam, confusion reigned supreme. After a long search with nobody paying any attention to us, I was able to locate a captain of the voluntary fire department in Rotterdam whom I asked for orders. None was forthcoming, however. I was told to take a hand wherever I thought I could do the most good. I investigated on my own and took a position against the wind. I stationed the fire engine at Schiedamse Singel next to the open water--the waterlines were still out at that time--and attacked with three 65 millimeter hoses. In front of me stretched a city district wholly aflame and in large part collapsed. The strong southeast wind drove the fire slowly but relentlessly in the remaining streets. The immense heat radiation as well as flying sparks spread the fire. The houses were deserted of people, and doors and windows had been left open in the hurried flight. Many windowpanes were smashed through the air raid. Through all these openings, the fire found a path into the homes.

My first action in the area in which I took up a position was to order the men to close all doors and windows. When the windowpanes were broken, I had them take down the curtains. With high pressure hoses I tried to prevent the further spread of the fire. We fought the fire till 2:00 a.m. and brought it to a standstill. At that time, all of a sudden, a large garage burst into flame. Now we were faced with the danger that our success so far would be nullified and that new fires would erupt in the street we were defending and in some of the neighboring streets. I therefore immediately gathered all my forces to fight the fire in the garage. By 7:00 a.m. we had the fire under control. With this action we saved the street as well as the neighboring area. I then got hold of a captain of the voluntary fire department, showed him the site, and asked for further orders.

Nowhere did I see any of the Rotterdam fire department in action. Nearby I saw a small contingent of the Utrecht fire department in action all by itself and without big ladders. Other fire brigades were nowhere in evidence. We left the site at about 8 o'clock in the evening of May 16. The force of the fire in the district in which I worked had greatly diminished by that time. The collapsed buildings were still burning, but the fire no longer spread to other streets.

Following are some of my observations:

Many streets, where there were no fires, were closed by debris. This debris originated from direct hits during the bombing attack.

Due to the failure of the water supply, at many sites the water had to be secured from open waters as far away as 400 to 600 meters. In some cases, the distance was 300 meters.

I am firmly convinced that had this air attack occurred in Amsterdam, the Amsterdam fire department would not have let it come to a catastrophe of this dimension. Had the separate fires been fought in time and efficiently, the conflagration would have been avoided.

I am also of the opinion that even as late as noon of May 15, the time when I arrived at the scene, much could have been accomplished had a unified command directed that a big stand be taken by all available forces against the wind, i.e., from north to south. Apparently no such command existed, and no leadership for overall operations was available.

(Signed) Nymeljer

Inspector de Graad, technical director of the professional fire department of Den Haag:

On May 14 at 7:00 p.m., I was sent by the Mayor of Den Haag with three fire engines to Rotterdam. As we approached the city, we saw a huge smoke and fire cloud in the sky over the city. I was so moved by this sight that I had tears in

my eyes. Since the main highway was destroyed or closed, we approached the city by detours. Despite prolonged efforts, I was unable to find anyone in command. I finally decided to act on my own. We happened to come to Jonker Franstreet where all the houses on both sides were on fire.

To the right, Gondsche Reijweg, which runs parallel, was also on fire to the same extent. Against these two burning streets I took up my position with the three fire engines against the wind. Open water supply was available at Jonkerstrasse. On Gonsche Reijweg, it had to be brought in from about 350 meters away. With the help of 8 large hoses working steadily for nine hours, we were able to contain the fire which was coming toward us at a width of about 400 meters.

There was a very strong wind which kept fanning the fire. The wind also caused a large amount of flying sparks. Since many windows were standing open, the sparks found their way into the buildings and started new fires. The houses in the burning streets where we labored were ordinary dwellings with stores on the ground floor. They burned rapidly and completely to the ground. Till we had the fire under control, new houses were constantly starting to burn. It could be observed that the fire spread across the insufficient firewalls from roof to roof. Firewalls leading up to the roofs do not exist in Holland. When the framework was ignited, the burning debris fell through the thin ceilings and spread the fire downward from story to story till the whole house was burning and eventually destroyed.

Toward 8 o'clock the next morning, I accidentally ran into the president of the Rotterdam Voluntary Fire Department, Pocrtman. He knew very little and could not answer most of my searching questions. Also, on my request for orders after the successful completion of my self-appointed task, I received no instructions of any kind. I looked for new tasks on my own. Excited civilians told me that at the Admiralty Kade, a large garage with many vehicles and supplies of gasoline had been set afire through flying sparks and endangered the still remaining residences. I found the garage to be partly on fire, as well as part of the apartments on top. The fire was just about to spread to a neighboring piano factory. Here too, open water was closely available. I was not able to save the piano factory, but I was able to prevent the fire from spreading

to the flats above the garage. After I had this fire more or less under control, I pulled out the third fire engine and stationed it at the Vredenoord Kade, where one house, in the middle of a living district which was still intact, had caught fire, probably due to sparks. The house was hosed with three hoses. In the meantime, by noon of May 15, another fire engine from the professional fire department of Den Haag had arrived. This fire engine, however, due to complete lack of any overall direction, could not find me and went to work on its own. After almost 24 hours of un-remitting labor, we were finally relieved by fresh forces from Den Haag. We were pretty worn out and all had a terrific thirst since there was no drinking water available and nobody bothered to try to get us anything to drink. The new forces worked for another 36 hours according to their own judgment at various points around the periphery of the conflagration.

It is my impression that the leadership of the voluntary fire department of Rotterdam was not equal to the task, either organizationally or technically. It is a well known fact that fires in Rotterdam, even during peace time, because of these deficiencies often spread much farther than they would with a modern, up-to-date, effective fire-fighting organization. In the face of a gigantic task such as that which was presented by the city-wide conflagration, it was obvious that they would fail completely. I also heard that the voluntary fire department of Rotterdam attacked the fire much too late when it was no longer possible to contain the separate fires. Some voluntary firemen reported to me during our fire-fighting operations and worked with us. But they went home to sleep during the night and did not return till the next morning. Also the voluntary fire department had very poor hoses. I saw many defective hoses where the water escaped at so many places that there was not sufficient pressure for the jet.

I am convinced that this catastrophe would not have occurred had Rotterdam had a good, well-disciplined professional fire department. The first crucial hours after the bombardment were left slipping by. When the out-of-town forces arrived on the evening of May 14, it was too late.

(Signed) de Graad

Ingenieur van der Veen, Director of Technical Services at the Railroad Station (Delfter Poort), residing in Rotterdam, Avenue Concordia:

The bombardment began at about 1:30 p.m. Dutch time. At that time I was in my apartment in the Avenue Concordia. Two houses down from my home, a house suffered a direct hit. I wanted to run to the air raid shelter across the street from my home, but the street was effectively blocked by smoke and grey-white steam (probably brick dust) and I could not see anything. After the smoke cleared away, I went to the shelter. The house that received the direct hit was on fire.

Across from the shelter, a house sustained a direct hit, probably from a small incendiary bomb. After a few minutes, flames shot out from the roof of the house as well as thick smoke. The block fire brigade, about 7 or 8 men, started fighting the fire with a hydrant cart at once. Here civilians, including girls, worked till late at night. Fire brigades were nowhere to be seen. Starting at this burning house, the whole city block eventually burned down, since I could not find any other starting fire in the street.

About 6:00 p.m., I tried to get to my post at Railroad Station Delfter Poort. Dutch military personnel prevented me from doing this and directed me to the outer periphery of the city. The district where I lived was supposedly to be defended against German troops. During this time I noticed that one free-standing mansion with a wooden roof and two free-standing mansions were ignited by flying sparks. I suspect that in the case of the latter two mansions, sparks flying through the open windows started the fire.

I learned from a reliable source that the railroad station was not on fire during the afternoon. During the night a strong east wind came up, driving the fire toward the station. Late on Wednesday night, one and a half days after the air attack and after a two-day fire, the station was completely destroyed.

The railroad station was occupied by Dutch military forces and, due to an impending attack by German troops, had been completely cleared of all civilians as well as all firemen. No attempt was made to halt the approaching fire at the large station plaza, even though this probably could have been done with a small force. The fire hydrants at the station were not working due to the destruction of



the water works, but there was an unlimited amount of water available from the canal at Stationssingel, directly behind the station (see Pictures 19 to 24).

The same situation existed at the Post Office across the street.

#### Comments on the Foregoing Eyewitness Accounts

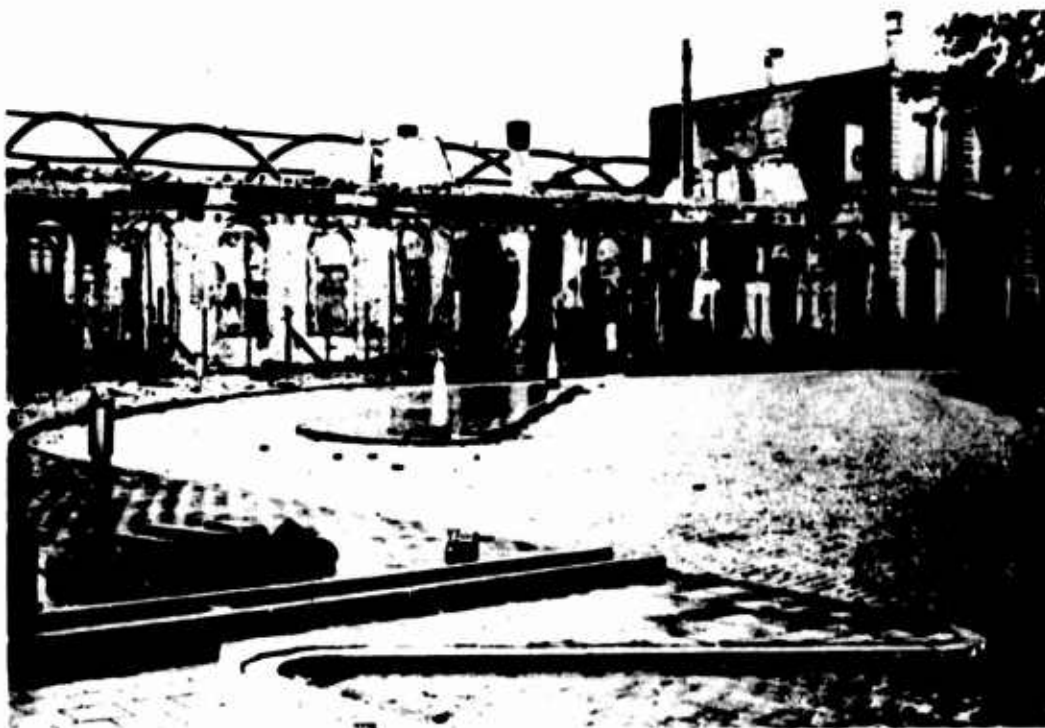
It is an established fact that in fire fighting, once a fire has spread past certain bounds, it is hard to tell when and where it can be brought under control. For a successful fight against fire, in general, the first hour after the fire starts is of the most critical importance. The "certain bounds" in the case of Rotterdam were reached when the various individual fires started to combine. What happened then was typically expressed by Lt. Colonel D. Sigert (retired), who was with the Air Force in World War I and wrote in an article as early as 1924: "The little fires combine. The heated atmosphere shoots upwards as in a giant chimney. The cold air which rushes after, along the ground, then produces the firestorm which in turn fans the fires farther away and carries them along in its path." Once the fire reached these dimensions, the position of the voluntary fire department was hopeless.

I have gained the impression through interviews with the captains and conversations with numerous other members of the voluntary fire department that the main reason for the size of the conflagration was to be found in the failure of the fire department to act during the first hours, or, more accurately, the first hours after the attack. The poorly disciplined units of the voluntary fire department apparently lost their heads and scattered in all directions so that--even if there had been leadership ability--disciplined, overall direction was probably impossible. The prospects for the fire department, despite its insufficient equipment, were fairly promising had they taken up the fighting of the numerous single fires at once and with vigor. In contrast to the Warsaw attack, the air attack on Rotterdam was of short duration. There was no threat of new attacks for the fire brigades; they could work under "peace" conditions. In addition, there was, despite periodic failure of the water lines, practically no shortage of water since there are so many open water sites on the harbor wharfs, the branches of the wet dock, the canals and drains, to an extent that could hardly exist in any other city.

I believe the case of Rotterdam cannot be used as a typical example. One cannot assume that after a short, violent air attack of moderate strength (45 to 60 airplanes), every city necessarily would go up in flames similar to Rotterdam. Where a well-disciplined, effective fire

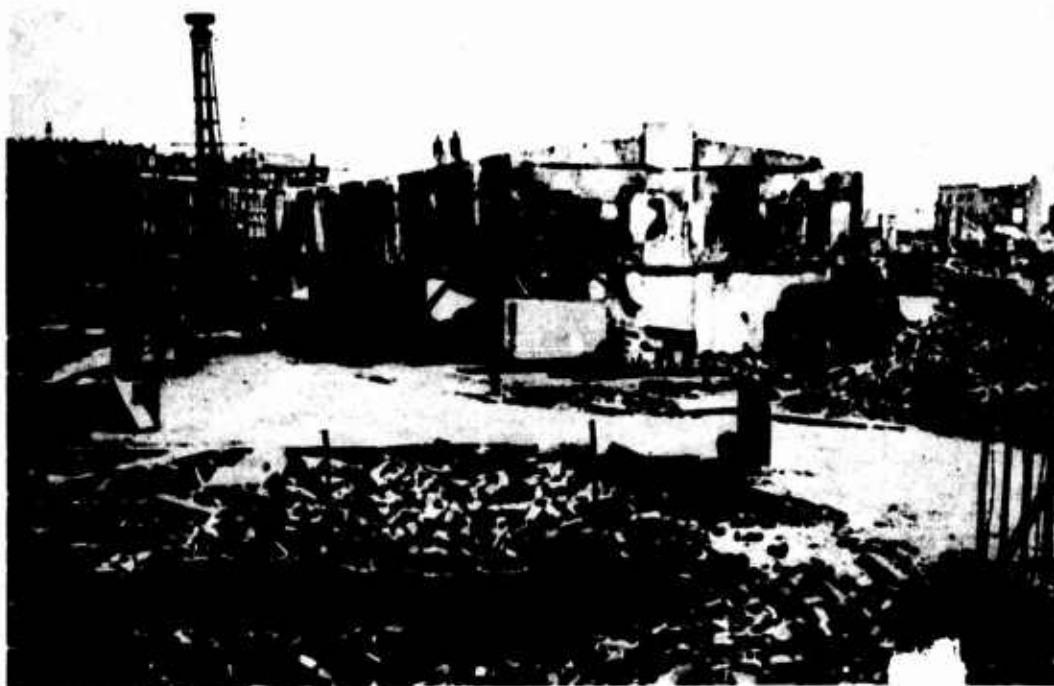


Pictures 19, 20 THE DELFTER POORT RAILROAD STATION, WHICH DID NOT CATCH ON FIRE  
UNTIL MAY 15, 1-1/2 DAYS AFTER THE BOMBING ATTACK





Pictures 21, 22 THE DELFTER POORT RAILROAD STATION





Pictures 23, 24 THE DELFTER POORT RAILROAD STATION



department exists under able leadership and with sufficient independent water supply, this need not happen.

### The Renewed Superiority of Effects of Fire

Almost always, after a cursory inspection of the ruins--even by experts--the opinion emerged that the great destruction was a result of high explosive bombs. This is only partially true. As was the case in Warsaw, the high explosive bombs achieved only limited pinpoint results while the big deciding results were achieved through fire in two ways: (1) directly through fire bombs or (2) as a secondary result of the high explosive bombs. Where the high explosive bombs hit a building without setting it afire, the extent of damage was severe but could almost always be repaired (see Pictures 25 to 30). It is different with the silent corroding effect of a fire bomb or with the effect of fire as a result of a high explosive hit. This latter, completely secondary, result of a high explosive bomb is not a frequent occurrence, according to most observations, but rather an exception to the rule. The greater the potential energy of a high explosive bomb--and the last war brought a big increase--the smaller the ability to ignite and cause fires. Only when existing fire sites, high voltage lines, or gas lines are hit, or when the population through panic relaxes its vigilance over open fires and light, will fires result as a rule.

The great contiguous areal destructions in Rotterdam resulted in the main from fires and not from high explosives. This conclusion emerges from all above eyewitness accounts; it was verified by later investigations.

Practically nowhere did the debris clearing crews find any beams, girders, posts, planks, doors, or window frames made of wood among the debris. Also, the fire sites of former purely residential districts were free of wood. The Dutch use wood as a building material, though not to the extent as in Germany. All this wood was burned. If the ruins had resulted from high explosive bombs, the wood would have been found among the debris (see Pictures 31 and 32).

A characteristic of fire ruins is the tangle of twisted metal. With the exception of a few buildings which received a direct hit by a high explosive bomb and were left standing without burning (see Pictures 25 to 30), all parts of the field of ruins show the typical destruction by fire, with the metal supports twisted by heat and fire (see Pictures 33 to 42).



**Picture 25** DIRECT HIT ON POST OFFICE BUILDING (NEXT TO THE CITY HALL; SEE CITY MAP, FIGURE 1). An example of pure high explosive bomb effects, i.e., hits from high explosive bombs that did not ignite.



**Picture 26** DIRECT HIT ON A RESIDENTIAL HOUSE. The bomb did not drop vertically through the roof but at an angle from above into the front wall of the house.



Pictures 27, 28 HOUSES DAMAGED BY BLAST ONLY







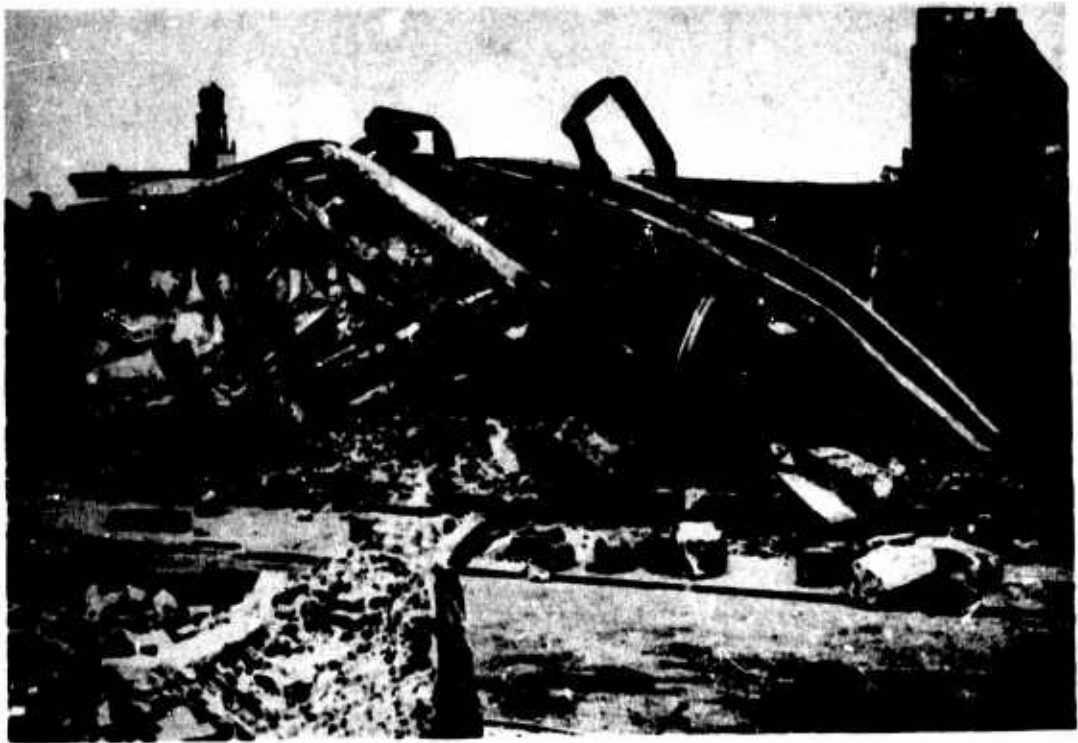
**Pictures 29, 30 BOMB HITS ON BUSINESS BUILDINGS THAT CAUSED PARTIAL DESTRUCTION  
BUT DID NOT DESTROY THE BUILDING COMPLETELY**





**Pictures 31,32 FIRE-DESTROYED STRUCTURES.** All wooden parts, like beams, floors, doors, window frames, and shafts are completely burned. The fire sites are completely free of wood.



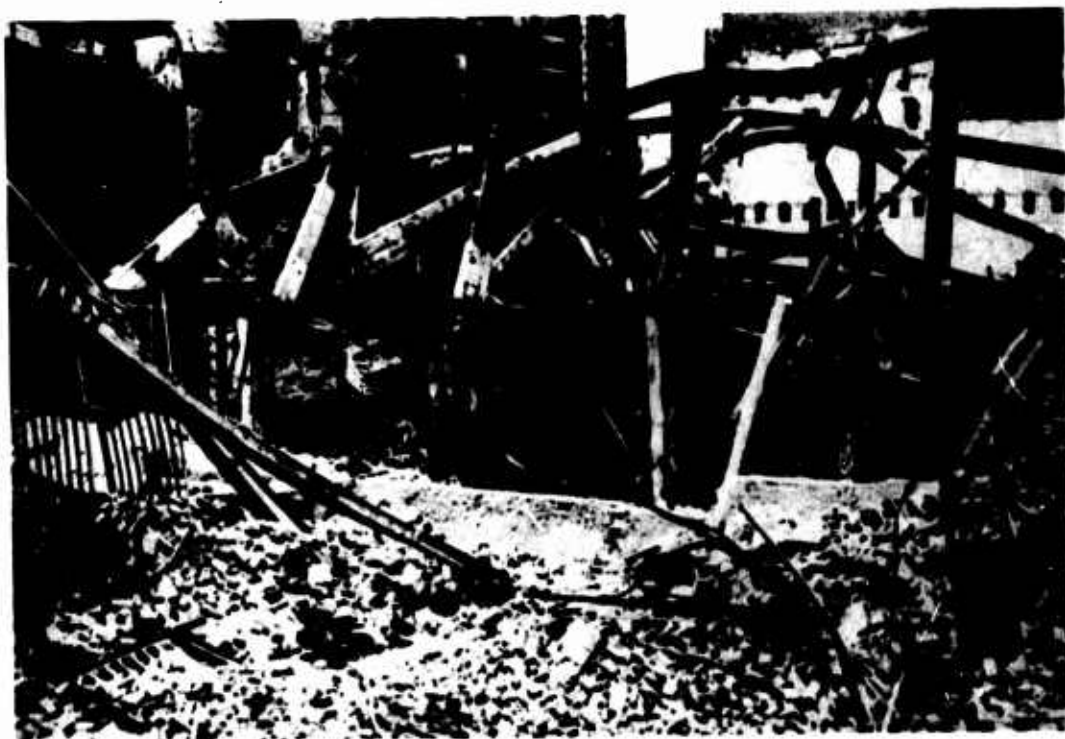


**Pictures 33, 34 TWISTED STRUCTURAL STEEL, CHARACTERISTIC OF STRUCTURES  
DESTROYED BY FIRE**





Pictures 35, 36 TWISTED STRUCTURAL STEEL, CHARACTERISTIC OF STRUCTURES  
DESTROYED BY FIRE



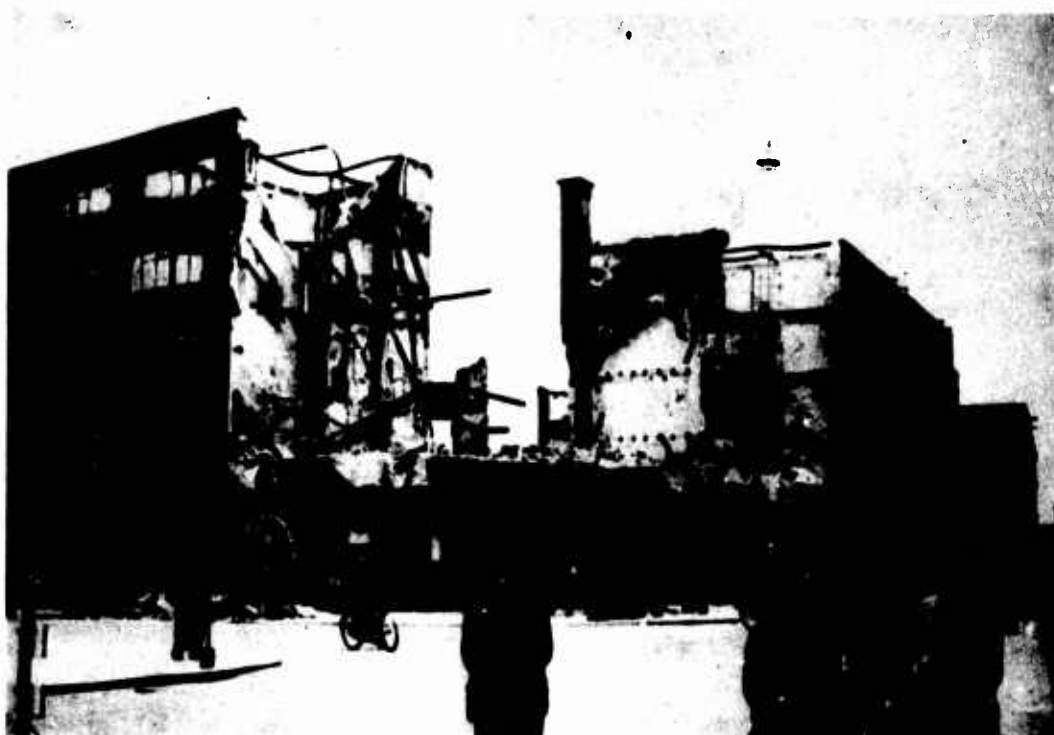


**Pictures 37, 38 TWISTED STRUCTURAL STEEL, CHARACTERISTIC OF STRUCTURES DESTROYED BY FIRE**

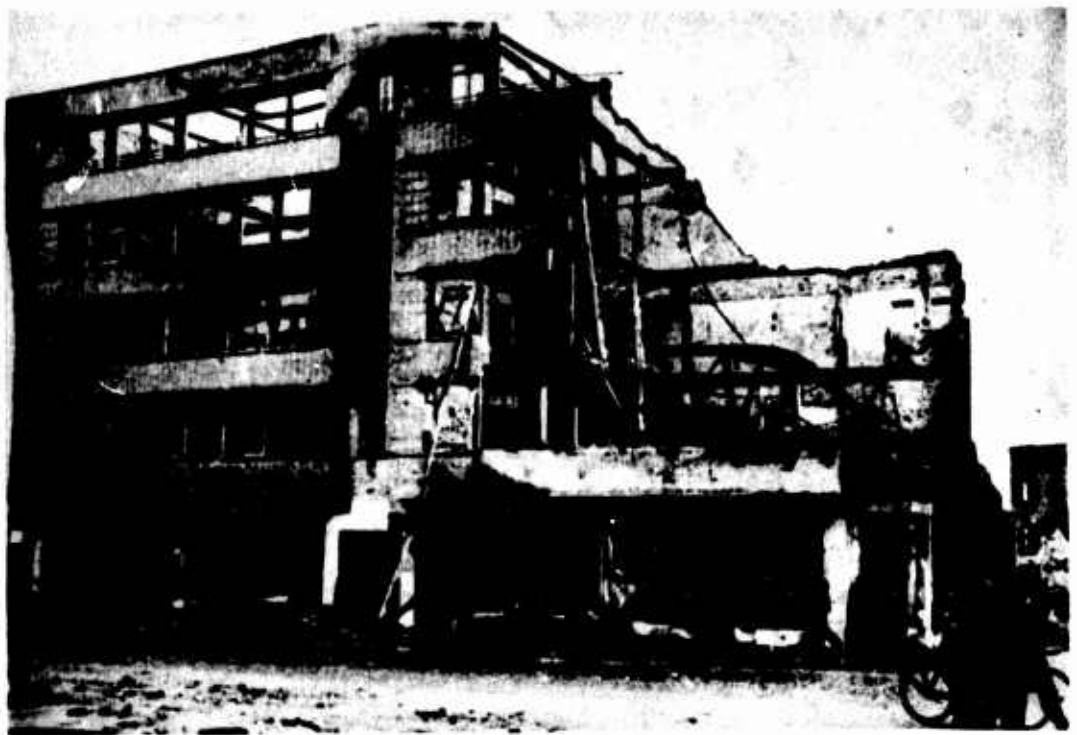




**Figures 39, 40 TWISTED STRUCTURAL STEEL, CHARACTERISTIC OF STRUCTURES DESTROYED BY FIRE**







**Pictures 41, 42 TWISTED STRUCTURAL STEEL, CHARACTERISTIC OF STRUCTURES DESTROYED BY FIRE**



Also, from the outside the countless blackened facades of remaining buildings show plainly that the destruction was accomplished by fire and not through the force of high explosive bombs (Pictures 43 to 55).

Another outstanding example of the fact that the destruction was caused by fire and not through high explosive bombs is presented by the skyscraper which the whim of the fire left standing intact (see city map, location b, Figure 1). Here all windows facing away from the wind were left undamaged. If the destruction of the neighboring houses had been effected by high explosive bombs, then all the window panes would have been broken due to the force of the detonation (see Picture 56).

Many houses and installations, according to evidence, did not catch fire till two days after the air attack because the fire department was not able to break the force of the fire and could not successfully defend the objects. An example of such a case is the railroad station Delfter Poort (see testimony of Ingenieur van der Veen, p. A-39).

#### Additional Observations

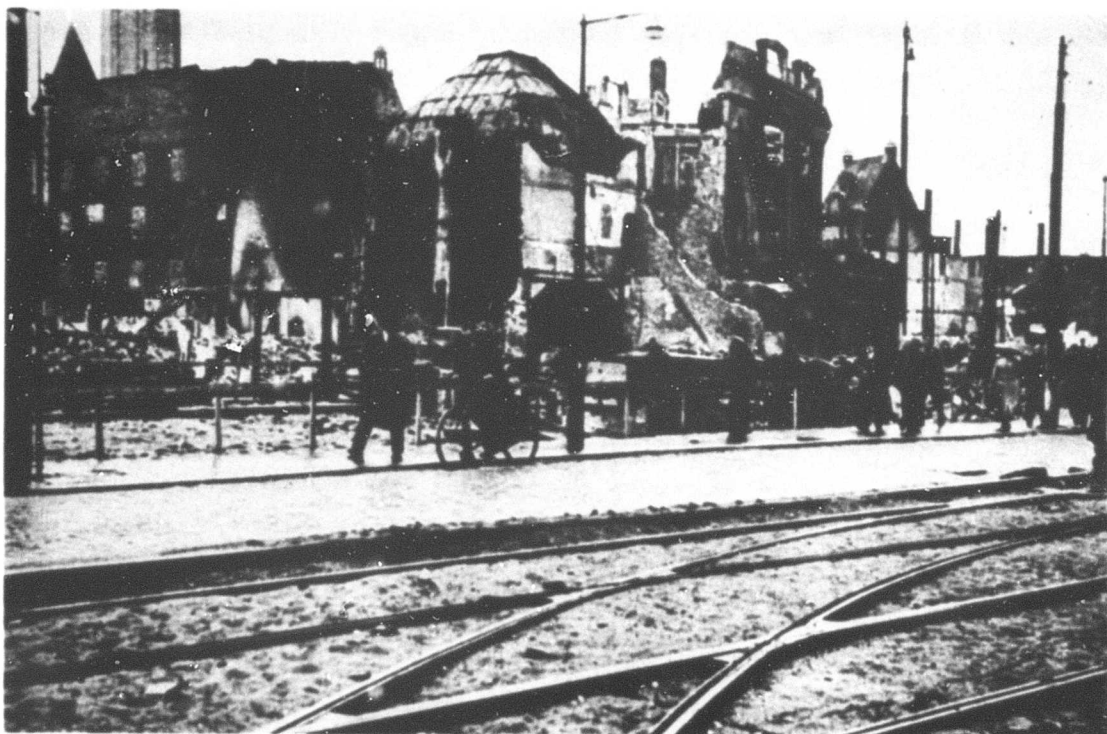
The spreading of the fires from a single burning house to neighboring houses and houses across the street occurred mostly through sparks flying through open doors and windows or through thermal radiation (curtains). In this way, whole city blocks or streets caught on fire.

The attacker has to strive to get as many doors and windows left open by the populace after a bombing raid. This can be achieved through the creation of panic following the air attack and through the detonation pressure of high explosive bombs. It seems, therefore, that for the bombing of cities, the mixed load of high explosive and fire bombs is proper and most effective.

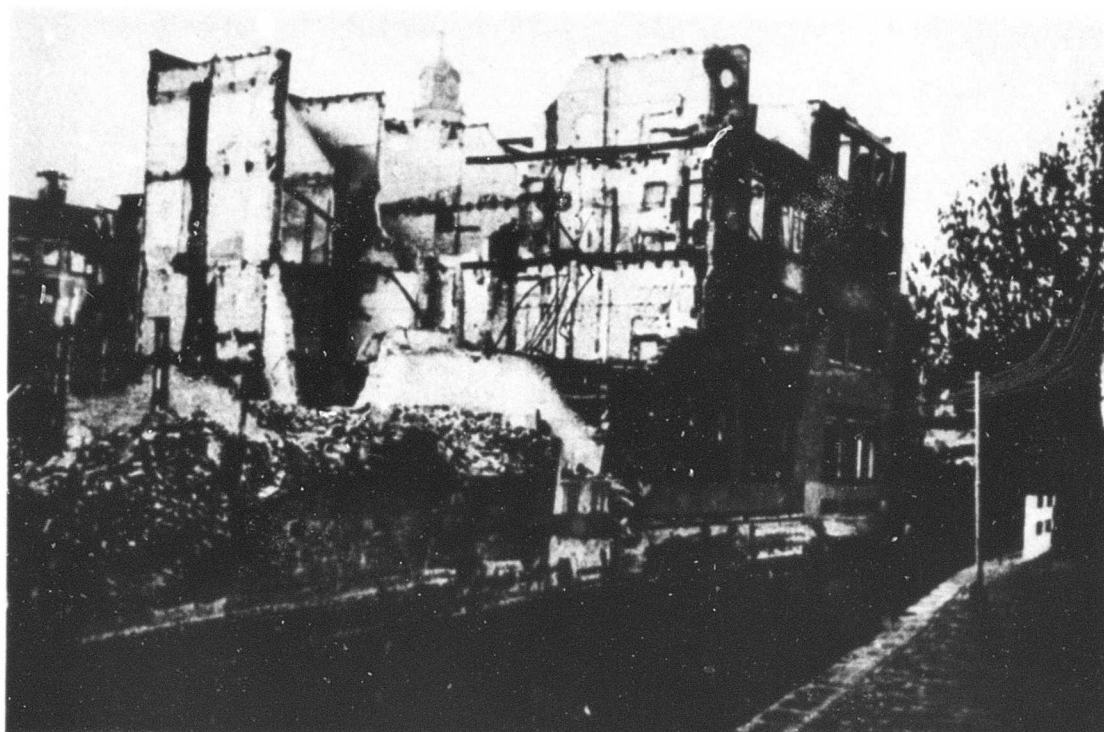
The defender has to think of ways to have doors and windows closed after an air attack. This could be accomplished through the education of the civil defense personnel (air raid wardens) and the general use of window shutters, which are being used with good results in some parts of Germany (e.g., South Germany and the East Mark) as air raid protection devices.

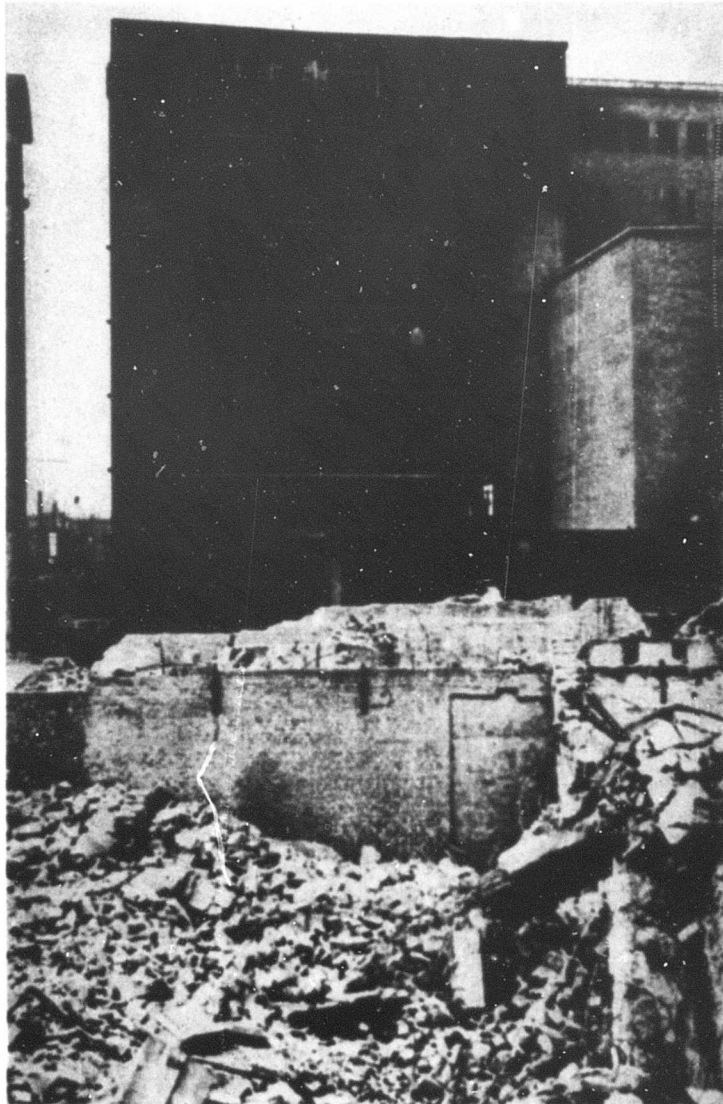
In other cases, the fire traveled from roof to roof because of insufficient fire walls, and in this manner whole rows of townhouses were set afire. From the roof, the fire traveled downward through the wooden beam ceiling from story to story until it reached the ground floor. In the end, the outer walls, now without supports, would collapse. So the end effect of the fire is the same as the end effect from a medium-sized



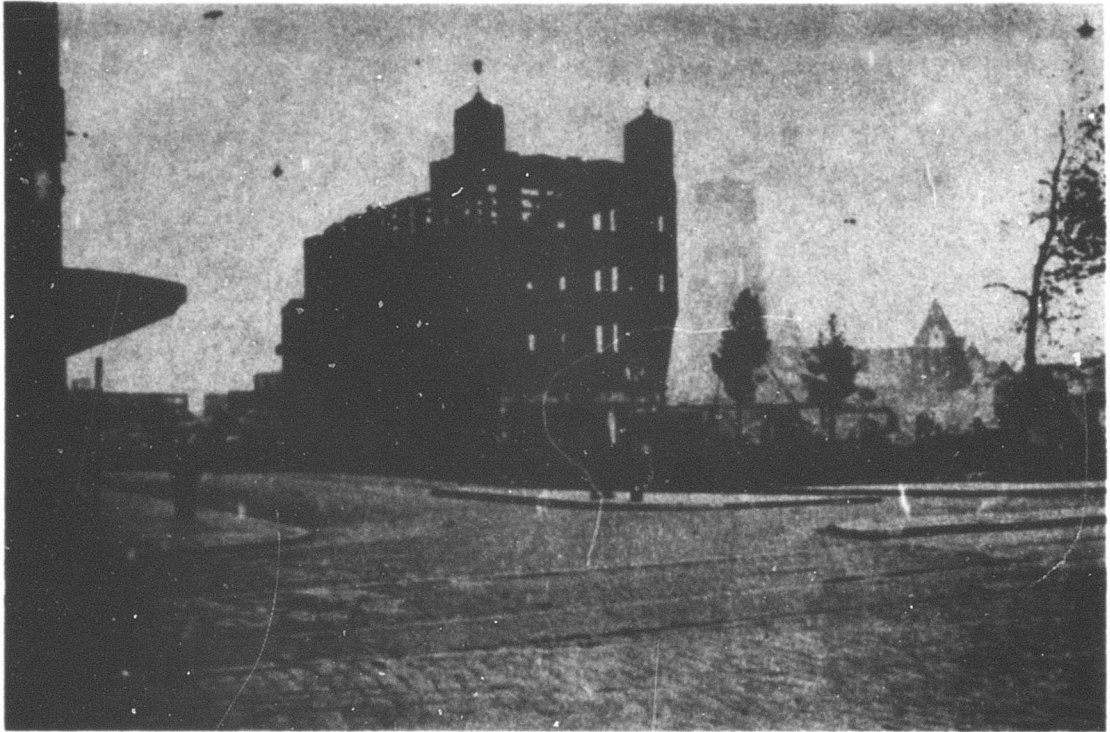


Pictures 43, 44 PICTURES OF SOOT-BLACKENED HOUSE FRONTS WHICH CLEARLY SHOW THAT DESTRUCTION WAS CAUSED BY FIRE AND NOT BY DETONATION OF HIGH EXPLOSIVE BOMBS





Picture 45 SOOT-BLACKENED STRUCTURES



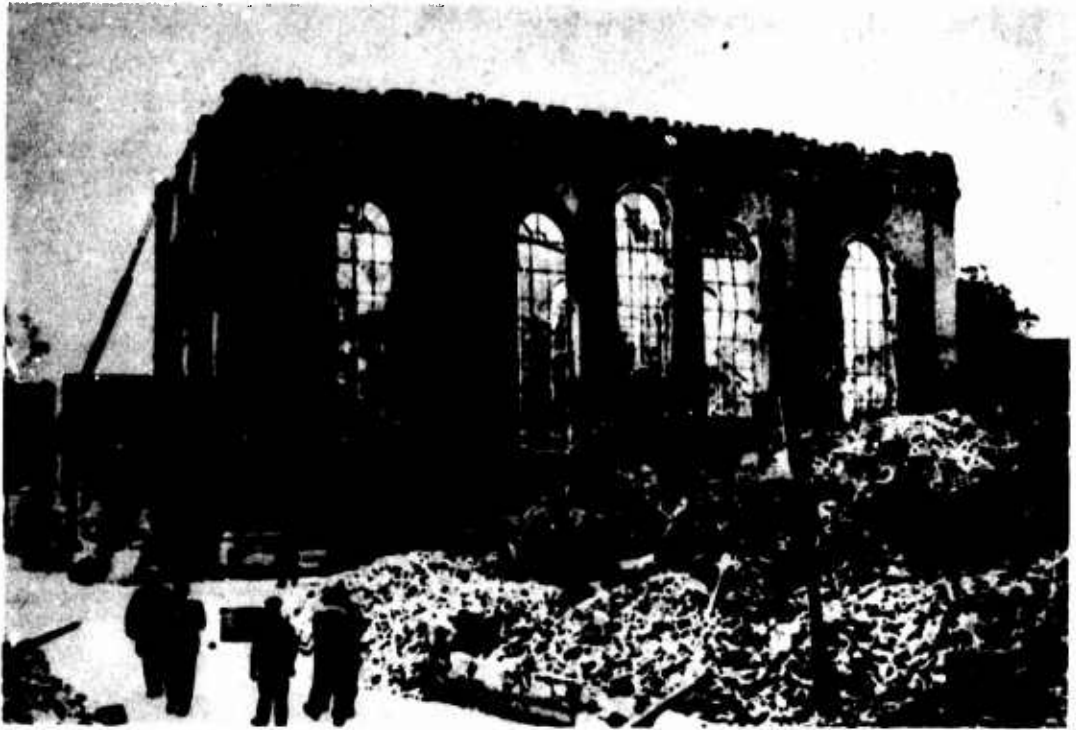
Pictures 46,47 SOOT-BLACKENED STRUCTURES





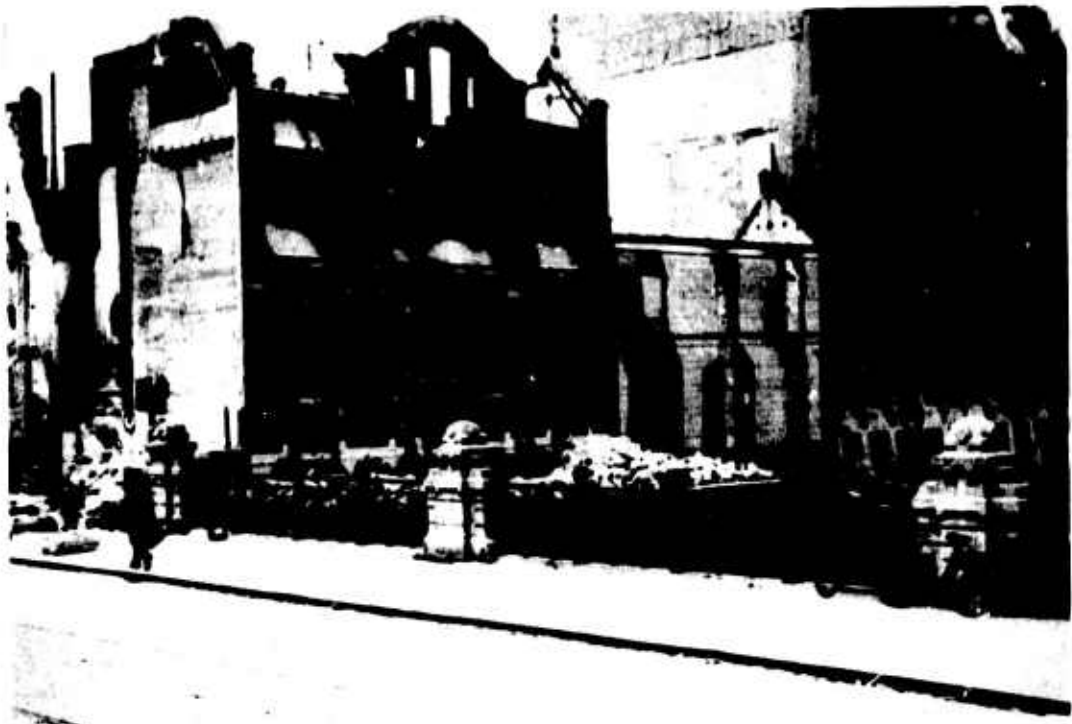
Pictures 48, 49 SOOT-BLACKENED STRUCTURES



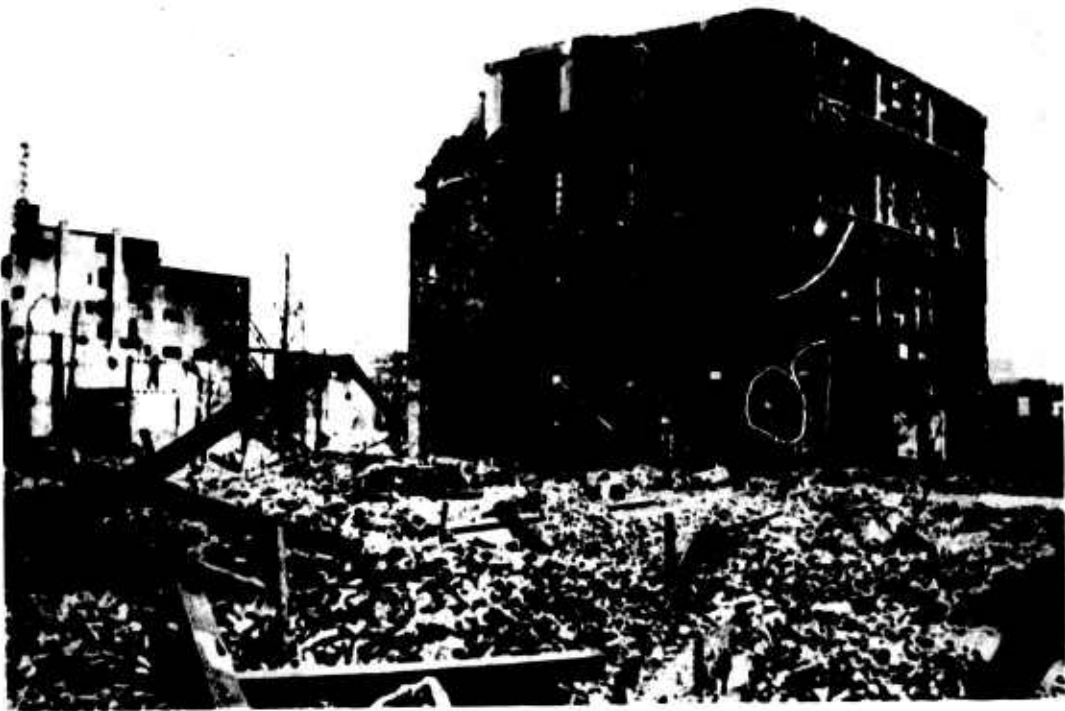


Pictures 50, 51 SOOT-BLACKENED STRUCTURES





Pictures 52, 33 SOOT-BLACKENED STRUCTURES







**Picture 54 SOOT-BLACKENED STRUCTURE**



**Picture 55 SOOT-BLACKENED STRUCTURE**





**Picture 56**   **UNDAMAGED SKYSCRAPER SURROUNDED BY DEBRIS FROM FIRE-DAMAGED STRUCTURES**

high explosive bomb, which destroys a city mansion in one hit (see Pictures 57 and 58).

The temperatures occurring in a citywide fire are much higher than the ones observed in single fires, even those of large dimensions. That copper, brass, and glass melted was not surprising. We even found melted beams, a phenomenon which points to decidedly higher temperatures (see Pictures 59 and 60). Brick buildings show fire damage from heat effects that usually result from heat and water combined (see Picture 61). The only things that successfully withstood the enormous temperatures were the steel safes built into the walls of banks (see Pictures 62 and 63).

The higher the temperatures, the greater the thermal radiation and its effect. Isolated cases occurred where thermal radiation spread the fire at a distance of 80 meters.

When a citywide conflagration reaches these dimensions, then the fireproof buildings will be victims of the fire the same as buildings of more flimsy construction, to the extent that only the inside of the former is combustible. Complete fire protection cannot be achieved through building methods alone if additional preventive measures (like distance from other buildings, closing of doors and windows) are not effective in preventing the fire from getting to the inside of the building and to its combustible contents.

Stands of trees surprisingly often brought the fire to a halt. In many cases, houses or groups of houses situated behind rows of trees or surrounded by trees remained undamaged. It therefore seems that the existence of a great number of trees in a city will have to be taken into consideration when estimating the vulnerability to fires after air attacks (see Pictures 64 to 66).

Paris, July 5, 1940

(Signed) H. Rumpf  
Colonel of the Fire  
Protection Police

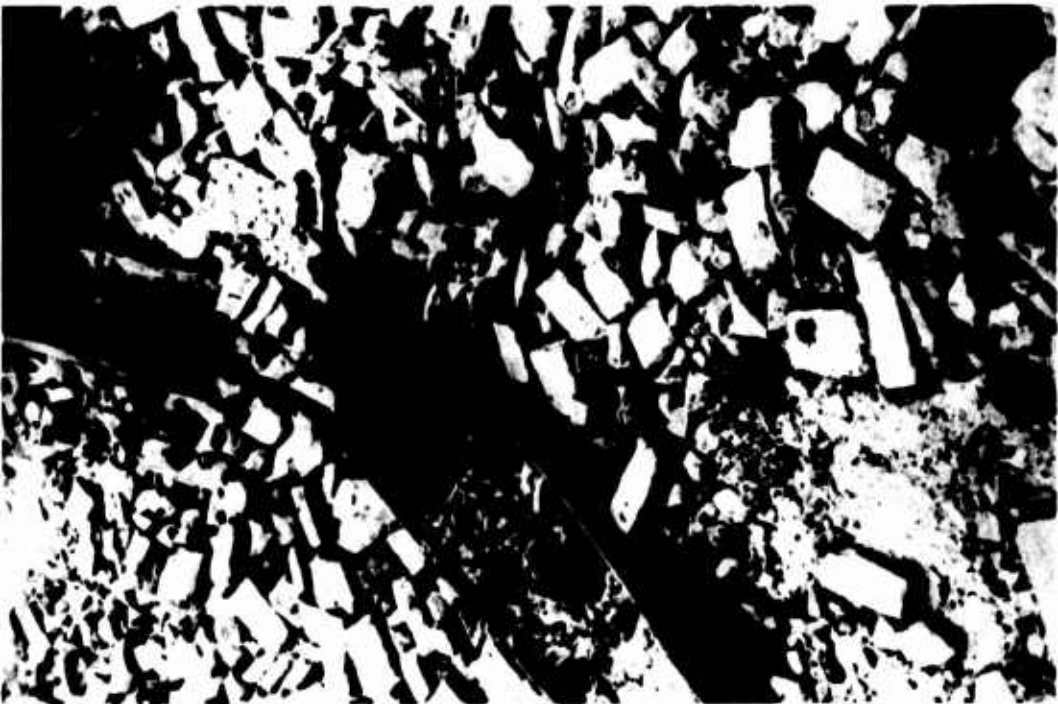


Pictures 57, 58 BLAST-DAMAGED MANSIONS AND APARTMENTS





Pictures 59,60 MELTED AND TWISTED BEAMS





**Picture 61 BRICK DAMAGE FROM EXTREME HEAT**



**Picture 62 STEEL VAULT IN CENTER OF DESTROYED BUILDING**



**Picture 63 STEEL VAULT IN MIDST OF BURNED-OUT STRUCTURAL DEBRIS**



**Picture 64 TREE FIREBREAK**



Pictures 65,66 TREE FIREBREAKS



**APPENDIX**  
**(to Rumpf's Report)**

It remains to be determined if and to what extent the specific Dutch building methods were responsible for the extent of leveling of houses, blocks of houses, whole streets, and city districts. The same should be determined for building materials and how they stood the test.

The Dutch house is built much flimsier than the German houses, especially as far as foundation and strength of walls and ceilings is concerned. All wooden construction is much lighter; for instance, where the Germans take a wooden beam, the Dutch will use a wooden plank placed on edge.

It is apparently not true that this building method is used because of the fact that Dutch soil is not very solid and much of Dutch land is situated below sea level. In any case, these methods are being used in locations where the ground is solid or even rock, as for instance in Den Haag.

Holland, being poor in natural stone, is dependent on brick. Most of the destroyed buildings were of brick or metal frame with brick masonry. Only a few larger public and private buildings were built of sandstone, and some very few public buildings, stores, and factories were of reinforced concrete. In addition, industrial and business buildings used stone for masonry with iron supports and as building material for inner walls.

Comparing the effect of fire on sandstone with the effect on brick, it must be reported that sandstone proved to be much more fire resistant than the Dutch brick. Picture 67 shows the completely gutted St. Laurens Church, which was a pure gothic building of sandstone. The spire and the columns show strong splintering and peeling. Picture 68 shows a sandstone support in the old stock exchange building, which, despite considerable weakening, still has enough strength to support construction. Picture 69 shows strong peeling manifestations on a sandstone niche of the railroad viaduct at Railroad Station Hofplein.

Two different kinds of brick are used in Dutch construction. One is a brick of yellowish-white color, and the other the ordinary red brick





**Picture 67 ST. LAURENS CHURCH SHOWING EVIDENCE OF  
FIRE-CAUSED SPLINTERING AND PEELING OF  
SANDSTONE**



**Picture 68** DAMAGED SANDSTONE COLUMN IN FIRE-GUTTED  
OLD STOCK-EXCHANGE BUILDING



**Picture 69 SANDSTONE PEELING OF VIADUCT AT HOPPLEIN RAILROAD STATION**

with which we are familiar. The color does not, as such, speak for the quality of the stone. The yellow brick, however, is much inferior to the red, since the former has a high sand content and compared with the red brick shows unevenness in texture (Picture 70). The red brick stood up much better in the highest temperatures and only shows peeling as in Picture 71 (compare with sandstone niches at the windows). The Dutch brick is much smaller than German brick. It is 16.5 x 8.5 x 4.5 centimeters in size. In great heat, the brick quickly loses firmness and after exposure to fire can be crumbled by hand without effort. Due to this loss of firmness together with shifting of overheated metal supports, many of the walls collapsed, resulting in the same effect as that caused by the detonation pressure of a high explosive bomb.

Picture 72 shows the fire wall of a warehouse (coffee and salad oil storage house), which, according to eyewitnesses, was destroyed solely by leaping flames.

The concrete used in the few concrete buildings was always very thin and of coarse flux. According to Dutch specialists, their construction practice dates from the earliest use of concrete in Holland, about the year 1914.

In the concrete buildings, the strength and thickness of walls and ceilings varied widely. The thickness of the walls in the newer and larger brick buildings and warehouses was 21 centimeters (1.25 stone) and less. Both the 1.5 and 1.25 stone-thick walls were support walls or "fire walls." Made from Dutch bricks, they did not serve their purpose as fire walls, especially since the beam heads were imbedded in the walls. In addition to this, it appears that many walls were not firmly anchored but showed a binder mortar layer from the bottom up, erected "contiguously" (Pictures 73 and 74, right wall).

This loose joining permitted the embedded girders, after heating up, to crush the walls they were supporting (Picture 74).

You can see in Picture 75--as hard as this may be to understand for a German--two outer walls of two neighboring buildings, where the left one has the thickness of only 0.5 stone or 8.5 centimeters.

Picture 76 shows the peculiar construction of the roof of a nightclub in the amusement district of Coolsingel. Eyewitnesses to the fire report that as soon as this kind of roof construction is set afire, jet flames will crawl behind the casings and spread the fire to the whole roof.

The effect of fire on reinforced concrete buildings is shown in Picture 77. In picture 77, the angle irons are torn out of the supports



**Picture 70 FIRE-DAMAGED YELLOW AND RED BRICKS**



**Picture 71 FIRE-DAMAGED BRICK AND SANDSTONE**



**Picture 72 FIRE-DESTROYED BRICK FIRE WALL**



**Picture 73 FIRE-DAMAGED BRICK FIRE WALLS**  
(Note contiguous mortar layer between inner and outer wall)



Picture 74 FIRE-DAMAGED BRICK WALLS





**Picture 75 ILLUSTRATION OF DUTCH BRICK WALL CONSTRUCTION**



**Picture 76 FIRE-DESTROYED ROOF OF NIGHTCLUB IN COOLSINGEL DISTRICT**



**Picture 77 FIRE-DAMAGED CONCRETE PILLAR WITH BENT ANGLE-IRONS**

through the effects of the fire. In other instances, the stone masonry lost firmness to such an extent that the reinforced concrete ceiling collapsed of its own weight.

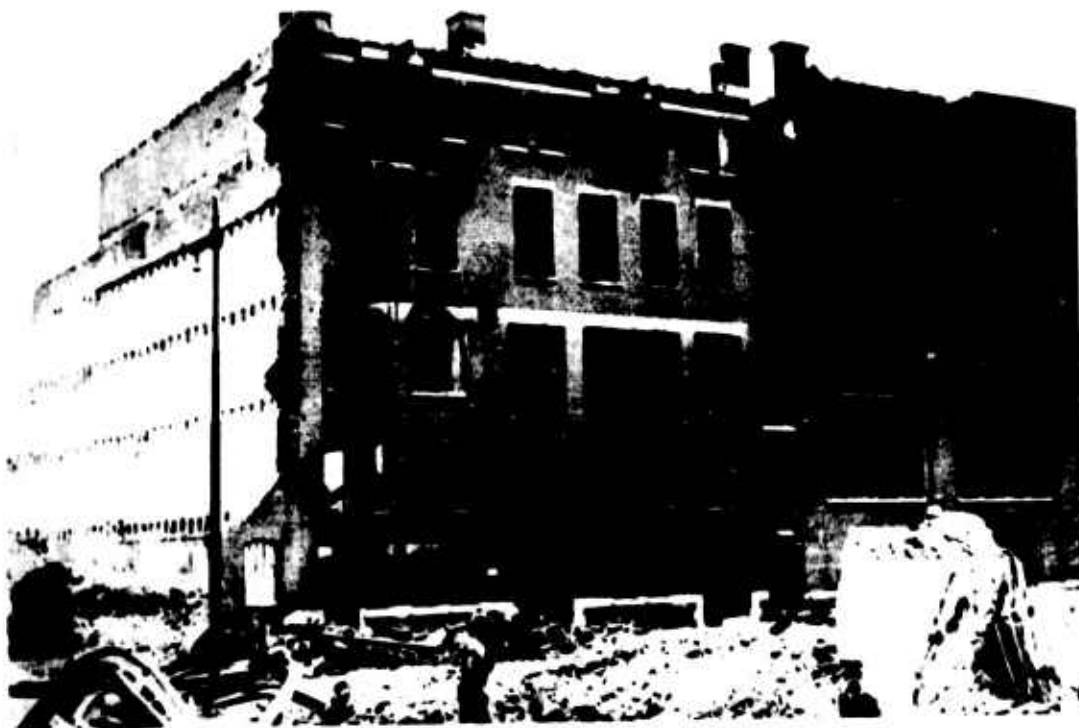
Wherever metal supports were sheathed in fireproofing, the sheathing was always too weak and thin; in most cases, the sheathing had a thickness of only 1 to 2 centimeters.

In contrast to the above-mentioned buildings made from Dutch brick, the buildings made from German brick stood up well in the fire and even survived better than concrete buildings. Picture 78 shows a warehouse and Picture 79 a department store (Brennigmeier). Both were gutted completely and all fixtures and merchandise burned. The German brick survived without crumbling and without sintering, thereby preventing collapse of the walls. In Picture 80, to the right, a Dutch clinker building can be seen with the hollow stone ceilings collapsed but with the outer walls left standing. On the left is the collapsed office building of the Rotterdam telephone company, built of Dutch brick. Pictures 81 and 82 plainly show the destruction as related to building methods and materials. In the foreground are totally destroyed residences and business buildings built of Dutch brick. The church in the background in Picture 81 and the office building in Picture 82 are built with brick and brick and sandstone, respectively.

The difference between sandstone and Dutch brick buildings is shown in Picture 83. The building of the Dutch bank, on the left, is of sandstone, and in front of this is a business building of steel framework and Dutch brick.

#### Summary

The light Dutch construction and, by our standards, the not very sturdy materials used in construction contributed greatly to the destruction of many buildings throughout the city because of the collapse of the buildings as a result of fire.



Pictures 78, 79 RELATIVE FIRE-RESISTANCE OF GERMAN BRICK





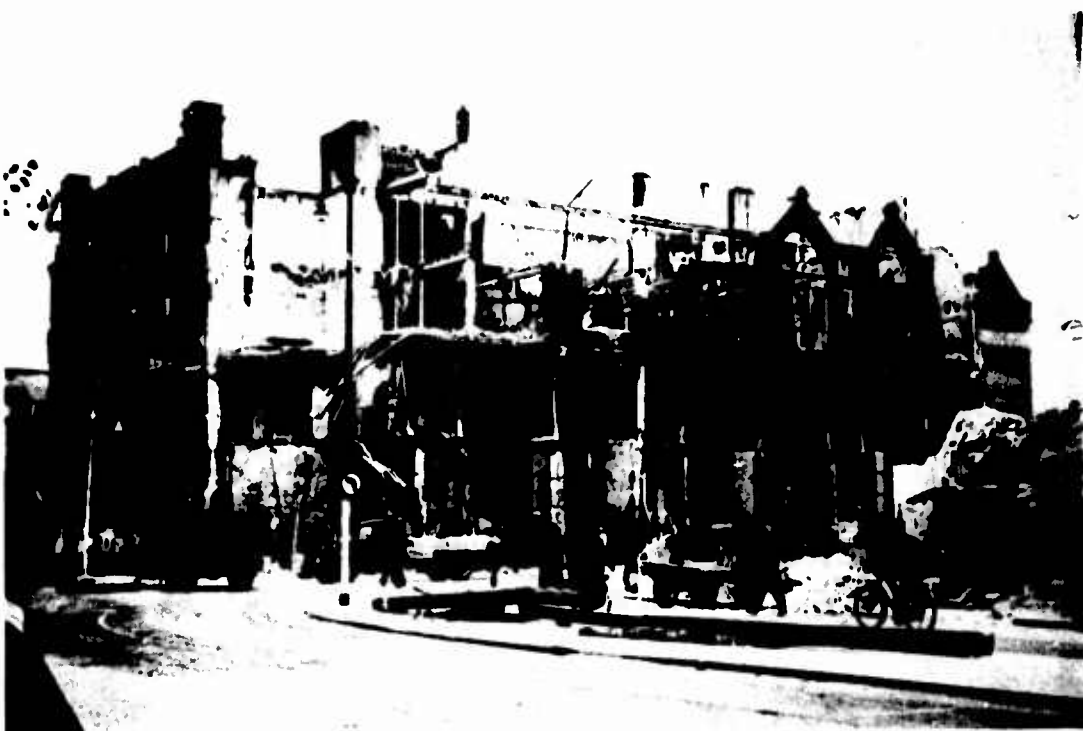
**Picture 80** RELATIVE FIRE-RESISTANCE OF GERMAN AND DUTCH BRICK CONSTRUCTION



**Picture 81** BRICK DEBRIS AFTER THE FIRE



**Picture 82 RELATIVE FIRE-RESISTANCE OF DUTCH AND  
GERMAN BRICK WALL CONSTRUCTION**



**Picture 83** RELATIVE FIRE-RESISTANCE OF SANDSTONE AND DUTCH BRICK WALL  
CONSTRUCTION



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